DUKANE

Intelligent Assembly Solutions

iQ Series

ULTRASONIC INTEGRATED PRESS SYSTEM

i220

AUTOMATED HAND PROBE PRESS

User's Manual

This User's Manual Covers These Models
20122XC0P3
20121XC0P3
20122XC0P5
20121XC0P5
20242XC0P3
20242XC0P5

Dukane Part No. 403–594-00

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This user's manual documents product features, hardware, and controls software available at the time this user's manual was published.

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Contents

Section 1- Introduction 1

General User Information 3

Press System Overview 4

Section 2 - Health and Safety 5

General Considerations 7

Plastics Health Notice 8

Electrical Safety 8

Pneumatic Safety 10

Lifting the Equipment 11

Section 3 - Installation 13

Before Installation 15

Install the Press System 17

Rear Layout Overview 18

Connecting Press Cables 27

Flange Template 32

Section 4 - Controls 33

Front Panel Controls 35

Screen Basics 40

Press Controls 41

Press Ergonomic Base 45

Section 5 - Operation 47

Press Start-up Sequence 49

Stopping the Weld Cycle 50

Using the Menus 51

Alarms 69

Section 6 - Options 71

Overview 73

Power Inlet Options 74

Distance Encoder 76

Continued

Continued from Previous Page

Contents

Section 7 - Acoustic Stack/Fixture Setup. 79

Overview. 81
Stack Description 82
Changing Stack Components. 83
Stack Assembly and Torque Values 85
Fixture Installation 87

Section 8 - Stack Maintenance 91

Inspection of the Acoustic Stack Components 93
Reconditioning Stack Components 94

Section 9 - System Maintenance. 97

Section 10 - Contacting Dukane 101

Section 11 - Specifications 105

Drawings 107-109
Weights, Dimensions, Operating Environment 110
Compressed Air Requirements 111
AC Power Requirements 111
Models, Ultrasonic Pressure 112
Replacement and Repair Parts Lists 113
Regulatory Agency Compliance 114

Section 12 - Appendices 115

Appendix A - List of Figures 117
Appendix B - List of Tables 120

Index 121

Continued

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SECTION 1

Introduction

General User Information 3
Read the Manual First. 3
Notes, Cautions, Warnings 3
Drawings and Tables 3
Press System Overview 4

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General User Information

Read This Manual First

Before operating your ultrasonic system, read this User's Manual to become familiar with the equipment. This will ensure correct and safe operation. The manual is organized to allow you to learn how to safely operate this equipment. The examples given are chosen for their simplicity to illustrate basic operation concepts.

This manual provides information to set up and operate Dukane's ***iQ Series*** Ultrasonic Integrated Press System, i220.

Models are listed in ***Section 11 - Specifications***.

Notes, Cautions and Warnings

Throughout this manual we use NOTES to provide information that is important for the successful application and understanding of the product. A NOTE block is shown to the right.

In addition, we use special notices to make you aware of safety considerations. These are the CAUTION and WARNING blocks as shown here. They represent increasing levels of important information. These statements help you to identify and avoid hazards and recognize the consequences. One of three different symbols also accompany the CAUTION and WARNING blocks to indicate whether the notice pertains to a condition or practice, an electrical safety issue or an operator protection issue.

Drawings and Tables

The figures and tables are identified by the section number followed by a sequence number. The sequence number begins with one in each section. The figures and tables are numbered separately. The figures use Arabic sequence numbers (e.g. –1, –2, –3) while the tables use Roman sequence numerals (e.g. –I, –II, –III). As an example, Figure 3–2 would be the second illustration in section three while Table 3–II would be the second table in section three.

NOTE

Note statements provide additional information or highlight procedures.

CAUTION

Caution statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING

Warning statements point out conditions or practices that could result in personal injury or loss of life.

Condition or Practice

Electrical Safety Issue

Operator Protection (hearing)

Press System Overview

An ***iQ Series*** Ultrasonic Integrated Press System combines the ***iQ*** generator and press (with thruster, switches, controls, and cables) in one unit. In addition, a complete system for welding would include a transducer, booster, horn, and fixture.

The i220 generator has rugged internal ultrasonic circuitry and ensures a continuous resonant frequency lock at the start of each weld.

This generator will operate at the same international line voltage input specifications as the other generators of this product family. It also includes an RFI line filter that passes FCC and strict CE test specifications for global applications.

SECTION 2

Health and Safety

General Considerations 7
Plastics Health Notice 8
Electrical Safety 8
Domestic Power Grounding 9
International Power Grounding 9
Pneumatic Safety 10
Lifting the Equipment 11

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General Considerations

Please observe these **health and safety recommendations** for safe, efficient, and injury-free operation of your equipment.

Proper Installation - Operate system components only after they are properly installed.

No Unauthorized Modifications - Do not modify your system in any way unless authorized to do so by Dukane Corporation. Unauthorized modifications could cause equipment damage and/or injury to the operator. In addition, unauthorized modifications will void equipment warranty.

Keep the Cover On - Do not remove any equipment cover unless directed to do so by Dukane Corporation. The integrated generator produces hazardous electrical voltages which could cause injury.

Grounded Electrical Power - Operate this equipment only with a grounded electrical connection.

See ***Electrical Safety*** for grounding instructions, Page 8.

Comply with Regulations - You may be required to add accessories to bring the system into compliance with applicable regulations (OSHA in the USA) for machine guarding and noise exposure.

Use Eye Protection - Wear ANSI approved safety impact goggles.

Acoustic Stack Hazard - When an acoustic stack (transducer, booster, horn and tip) is energized by the ultrasound signal, it presents a potential hazard. Stay clear of an energized stack.

System Abort Switch - Install a system abort switch at each operator station when ultrasonic plastic assembly equipment is used with automatic material handling equipment in an automated system.

Foot Switch - Do not use a foot switch. Using a foot switch in place of the optical touch finger switches (activation switches) violates OSHA regulations.

NOTE

These recommendations apply to the welding system. System in this manual refers to a complete group of components associated with the welding of parts, also known as an ultrasonic assembly system. A typical i220 system consists of the i220, a press with a thruster, switches, controls, cables, a transducer, booster, horn, and a fixture.

WARNING

Any fixture manufactured by a third party must comply with all OSHA and ANSI requirements. All fixtures must be guarded as necessary.

Dukane Corporation does not assume any responsibility or liability for fixtures manufactured by the customer or any third party manufacturer.

WARNING

Never operate the generator with the cover off. This is an unsafe practice and may cause injury.

CAUTION

At some time you may be asked to remove equipment covers by the Dukane Service Dept. personnel. Before doing so, disconnect the unit electrically from the incoming line AC power. If the unit is a press/thruster, lock the Air Lockout Valve, located on the rear panel, in its closed position.

Continued

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General Considerations

Pre-trigger - The pre-trigger feature starts the horn vibrating before contacting the part to be welded.

System Electrical Cabling - Electrical power must be off when connecting or disconnecting electrical cables.

Do Not Wear Loose Clothing or Jewelry - They can become caught in moving parts.

Stay Alert - Watch what you are doing at all times. Use common sense. Do not operate the press when you are tired or distracted from the job at hand.

Do not Operate the Equipment - Your judgement or reflexes could be impaired while taking prescription medications. If so, do not operate the equipment. Be familiar with warning labels and recommended activity restrictions that accompany your prescription medications. If you have any doubt, do not operate the equipment.

Plastics Health Notice

Certain plastic materials, when being processed, may emit fumes and/or gases that may be hazardous to the operator's health. Proper ventilation of the work station should be provided where such materials are processed. Inquiries should be made to the U.S. Department of Labor concerning OSHA regulations for a particular plastic prior to processing with Dukane ultrasonic equipment.

Electrical Safety

The ***iQ Series*** press provides the operating power and power returns. Make sure the press is grounded properly.

In addition to the safety considerations, proper grounding is essential for the effective suppression of RFI (Radio Frequency Interference). Every press contains a RFI filter which blocks noise on the AC power line from entering the control circuitry. This filter also prevents ultrasonic RFI from being fed back into the AC power line.

If you experience problems with RFI from the press, run an additional grounding wire from the press base grounding stud to the nearest grounded metal pipe or equivalent earth ground by means of a ground clamp. Use at least 14 AWG wire for the connection to the press base.

CAUTION

Parts being joined ultrasonically will at times vibrate at audible frequencies. Wear ear protectors to reduce annoying or uncomfortable sounds. In addition, ultrasound baffles, sound enclosures, or materials that absorb sound may be located to surround the system. Ultrasound pressure level could exceed 110dB. See Ultrasonic Pressure, Table 11-VI, Page 112.

WARNING

Keep head, hands, limbs and body at least six inches (152 mm) away from an operating press/thruster. A vibrating, descending horn can cause burns and/or crushing injuries.

CAUTION

When making cable connections to system equipment or disconnecting cables from system equipment, make sure electrical power to the system is turned off, and AC power cords are removed from their receptacles. After the cables have been securely connected and the connections and cable routing checked a final time, the power may be restored.

Continued

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Domestic Power Grounding

For safety, the power cords used on this product have a three-wire, grounding-type power cord. Figure 2-1 illustrates the appropriate electrical outlet to use with the power cord that is included with systems shipped to North America.

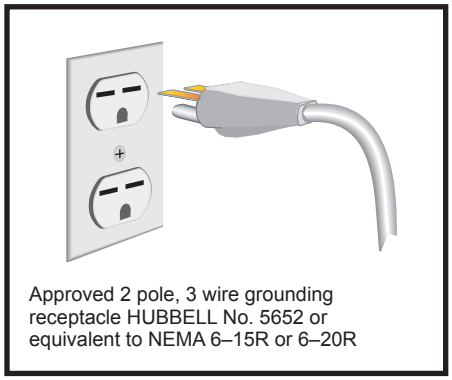

Figure 2–1 Example of 220/240 Volt, Grounded, 3-Prong Receptacle

International Power Grounding

The power cable normally provided for international use is compatible with the power outlet used in many Continental European countries (Refer to Figure 2–2.) However, if your application requires another type of power cord, check with your equipment supplier, and follow local regulations concerning proper wiring and grounding.

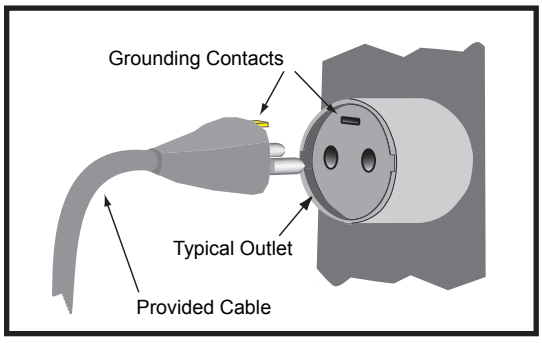

Figure 2–2 International 220/240V Grounding

CAUTION

If you have a two-prong electrical receptacle, we strongly recommend that you replace it with a properly grounded three-prong type. Have a qualified electrician replace it following the National Electric Code and any local codes and ordinances that apply.

See Figures 2–1 and 2–2.

CAUTION

If there is any question about the grounding of your receptacle, have it checked by a qualified electrician. Do not cut off the power cord grounding prong, or alter the plug in any way. If an extension cord is needed, use a three-wire cord that is in good condition. The cord should have an adequate power rating to do the job safely. It must be plugged into a grounded receptacle. Do not use a two-wire extension cord with this product.

100/120 Volt Systems (North America or Japan)

The power cord (including strain relief) supplied with the 100/120 AC systems is permanently attached to the rear of the press. Units with this power cord are for use in North America or Japan.

Pneumatic Safety

A safety isolation lockout valve is installed in series with the compressed air filter and is capable of isolating the compressed air supply from the pneumatic cylinder on the press. This device complies with OSHA regulations.

Always isolate and lockout the compressed air when performing any maintenance on the press. The isolation lockout valve is shown in Figure 2–4.

CAUTION

Lockout valve must be closed and secured with a padlock before servicing the press.

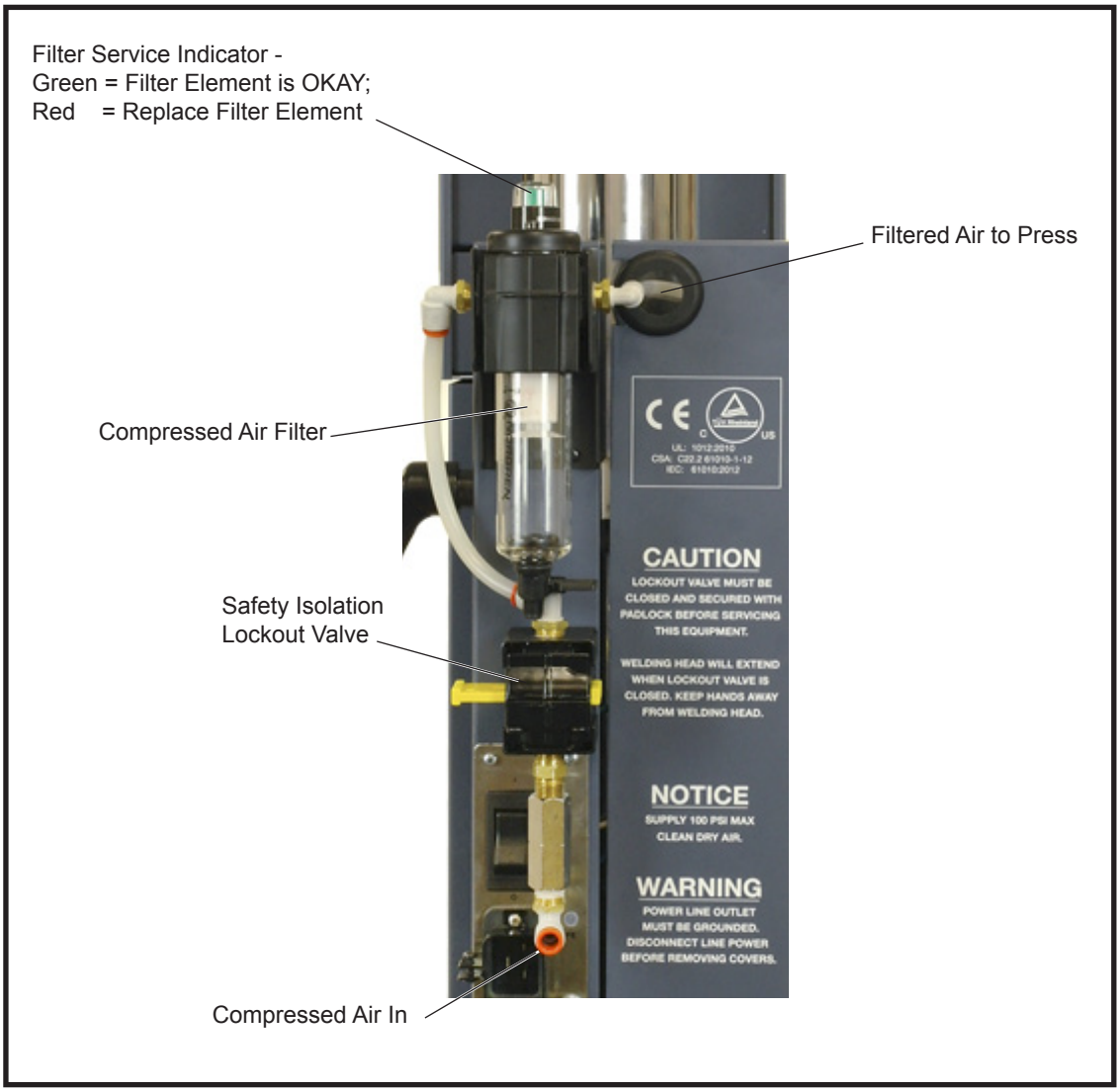
Filter Service Indicator -
Green = Filter Element is OKAY;
Red = Replace Filter Element
Filtered Air to Press
Compressed Air Filter
Safety Isolation
Lockout Valve
Compressed Air In
CAUTION
LOCKOUT VALVE MUST BE CLOSED AND SECURED WITH PADLOCK BEFORE SERVICING THIS EQUIPMENT.
WELDING HEAD WILL EXTEND WHEN LOCKOUT VALVE IS CLOSED. KEEP HANDS AWAY FROM WELDING HEAD.
NOTICE
SUPPLY 100 PSI MAX CLEAN DRY AIR.
WARNING
POWER LINE OUTLET MUST BE GROUNDED. DISCONNECT LINE POWER BEFORE REMOVING COVERS.

Figure 2–3 Compressed Air Filter

Lifting the Equipment

How to Lift Safely

Use a mechanical lifting device to safely lift this system.

The ***iQ Series*** Ultrasonic Integrated Press System i220 is too heavy to lift manually.

When lifting anything follow these common sense steps:

- Before lifting any equipment, take a moment to think about what you're going to do.
- Examine the object for sharp corners, slippery spots or other potential hazards. Know your limit and don't try to exceed it.
- Ask for help if needed, and make any adjustments to the lifting device.
- Know where you are going to set the item down, and make sure that placement area and your path are free of obstructions.
- Lift the equipment with the mechanical lift device, and move the equipment carefully.

CAUTION

Use a mechanical lift device to assist in safely lifting system components.

NOTE

Equipment weights are shown in ***Section 11 - Specifications, Table 11-I***.

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SECTION 3

Installation

Before Installation 15
Install the Press System. 17
Unpacking 17
Rear Layout Overview 18
A.C. Power Inlet Panel 19
System I/O Panel 20
Base/Abort Connector (J6) 24
Ground Detect (J2) 24
EtherNet (J9) 24
USB (J3) 24
Base Connections 25
RFI Grounding 26
Connnecting Press Cables 27
Install the Press without Machine Base 30
Automation System 31
Flange Template 32

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Before Installation

As you plan for the installation of your system, consider these important subjects as listed below:

- When to use lockout / tagout devices
- Lifting the equipment safely - See ***Section 2 - Health and Safety, Page 11***.
- Utilities
- Placement

WARNING

Electrical safety hazards exist inside the i220 press-chassis. Before making any internal adjustments to the i220 press, apply a lockout/tagout (LOTO) device to the i220 press chassis.

When to Use Lockout / Tagout Devices

Figure 3-1 Lockout Device In Open Position, Unlocked

The typical kind of LOTO device for an i220 press is a clam shell type device (with lockout capability). The LOTO device is placed over the plug end of the electrical cord. This effectively prevents access to the energy isolation point. See the example of one such device in the figure above.

The figure to the right shows the lockout device in the closed, locked position.

Figure 3-2 Bottom Lockout Device In Closed Position, Locked

Continued

Continued from Previous Page

Lockout/Tagout

Procedure to use BEFORE making any internal adjustments to the i220 press:

1. Push the press AC power switch/breaker to the OFF position.
2. Unplug the press electrical cord from its source.
3. Authorized personnel apply a lockout/tagout (LOTO) device to the plug end of the press electrical cord. Using a typical clam shell type LOTO device:
    1) Open the clam shell.
    2) Place the electrical cord plug end inside the shell.
    3) Close the shell.
    4) Secure the shell with its lock, and lock it.
4. Wait a minimum of five minutes for the press to discharge its electrical energy.
5. After taking these steps, make the necessary adjustments.

Assuming the press is being put back into service.

Procedure to use AFTER making any internal adjustments to the i220 press:

1. Authorized personnel remove the lockout/tagout device from the plug end of the electrical cord. Using a typical clam shell type LOTO device:
    1) Unlock the protective shell.
    2) Open the shell, exposing the electrical cord end.
    3) Remove the LOTO device, and set it aside.
2. Plug the press electrical cord into its AC power source.
3. Push the press AC power switch/breaker to the ON position.

Utilities

Provide for electricity to meet the equipment specifications as shown in ***Section 11, Specifications***.

CAUTION

If transducer cooling air is used, this compressed air must be clean, dry and oil free. Any particulate, oil contamination or moisture can coat or clog the transducer. This can result in premature failure of the transducer. Air pressure is determined by the application, transducer power draw and ambient air temperature.

Placement

Check that enough space has been set aside for the installation. Equipment dimensions are shown in ***Section 11, Specifications***.

Install the Press System

The integrated press system consists of an ***iQ*** generator, a thruster, an ergonomic base and a support package. It is assembled at the factory for shipment.

Unpacking

The press system is secured to a wooden pallet and covered with a wooden crate. Components inside the crate are secured with metal bands, and with additional packing materials to give reinforcement when needed.

Before unpacking the press, take care and use mechanical assistance to move it close to the location where it will be installed.

1. Carefully remove the wooden crate from the base to expose the contents.
2. Remove the packing material, and temporarily set aside any other system components, leaving the press on the shipping base.
3. Inspect the assembly for any damage before placing it in position.

Moving the Press into Place

Do not lift the press by hand. Use mechanical means to put the press into place.

To place the press on the work area, use a pallet lift platform or equivalent. Raise the assembly until the bottom edge of the base is even with the top of the work area as shown in Figure 3-14. Then, carefully slide the press system on to the work area.

CAUTION

DO NOT LIFT the press manually. Lifting and/or moving the press manually could result in personal injury. Use mechanical means to move and place the press.

See ***Section 2, Health and Safety, Page 11*** on safe lifting practices.

Rear Layout Overview

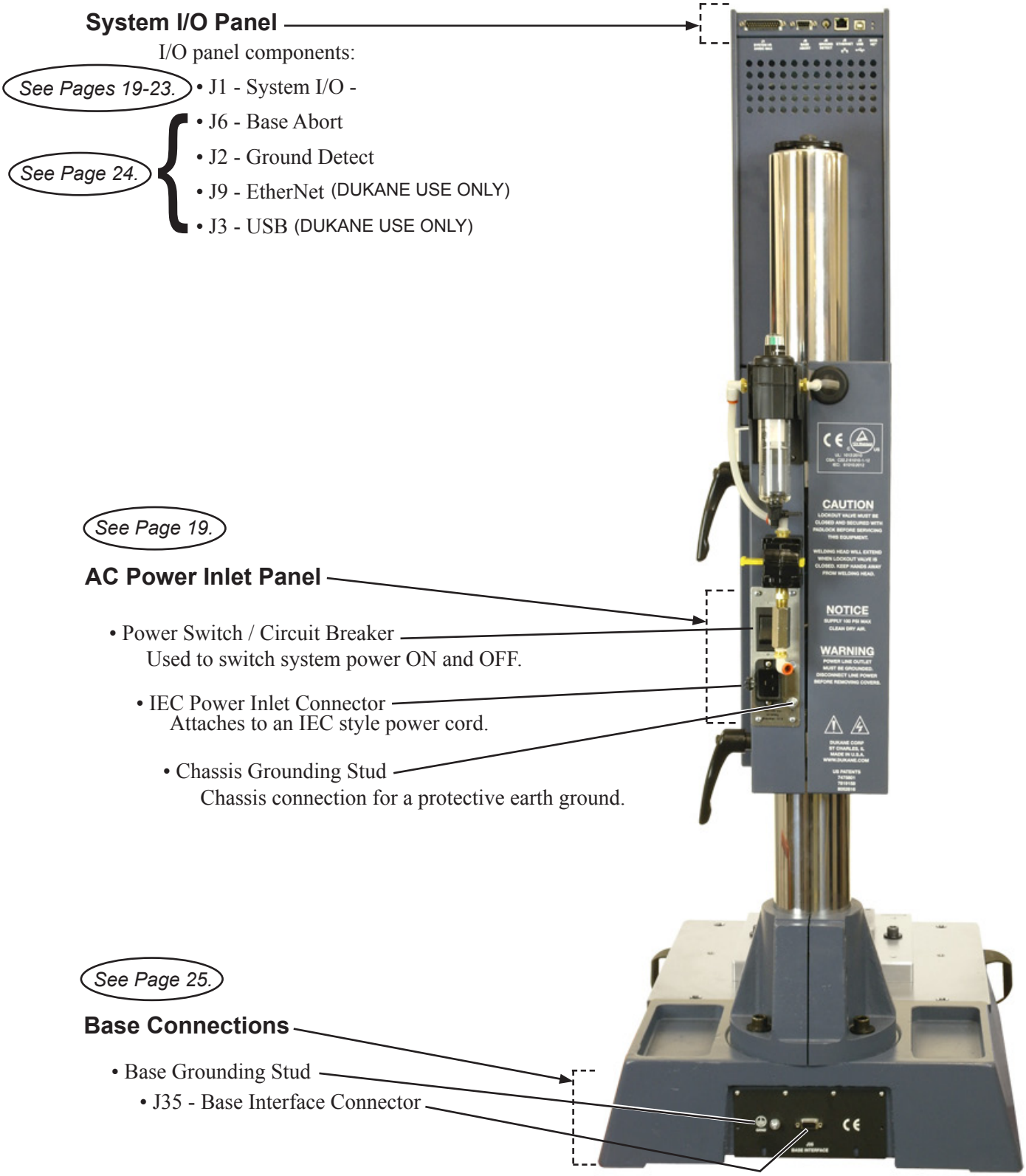
System I/O Panel
I/O panel components:
See Pages 19-23.
• J1 - System I/O -
See Page 24.
• J6 - Base Abort
• J2 - Ground Detect
• J9 - EtherNet (DUKANE USE ONLY)
• J3 - USB (DUKANE USE ONLY)
See Page 19.
AC Power Inlet Panel
• Power Switch / Circuit Breaker
Used to switch system power ON and OFF.
• IEC Power Inlet Connector
Attaches to an IEC style power cord.
• Chassis Grounding Stud
Chassis connection for a protective earth ground.
See Page 25.
Base Connections
• Base Grounding Stud
• J35 - Base Interface Connector
CAUTION
NOTICE
WARNING

Figure 3-3 Press Rear View

AC Power Inlet Panel

The standard AC power inlet panel is described here.

IEC AC Power Inlet Connector

The IEC AC power inlet connector mounted on the system AC power inlet panel requires a properly configured IEC compliant power cord, which enables worldwide system operation by simply changing the power cord.

The 240VAC i220 systems include a 16/20 amp rated IEC inlet. 120VAC systems include a non-detachable power cord.

An appropriately rated power cord must be securely attached to the welding system's IEC inlet connector. If the correct power cord configuration is not included with the system for the local AC power outlet at your location, an appropriate IEC power cord should be available from a local electrical parts supplier. Note that the system undervoltage lockout will inhibit system operation if a North American power cord configured for 120V is connected to the system. A minimum of 200V is required for the system to operate.

Power Switch/Circuit Breaker

The power switch/circuit breaker has a rocker type actuator switch that will activate or deactivate the AC power to the system. The power ON position is marked with the internationally recognized I symbol, the power OFF position is marked with the 0 symbol. This power switch also integrates an appropriately sized over-current protection circuit breaker function in the press.

If an over-current condition trips the circuit breaker, it will automatically switch to the OFF position. If the overload current that caused the circuit breaker to trip is due to a transient condition, the circuit breaker can be reset by switching the actuator back to the ON position. If when resetting the circuit breaker after it has tripped, it immediately trips again, there is likely an internal system malfunction that will require service.

Do not repeatedly try to reset the circuit breaker. If it trips, this will only cause more damage to the press.

Chassis Grounding Stud

The chassis grounding stud is used to attach a protective earth ground to the press. This will aid in the suppression of electrical interference or radio frequency interference (RFI) that is common in an industrial environment. The chassis ground stud is shown in Figure 3-3. Proper system grounding is discussed on Page 9, and see Page 26 for RFI Grounding.

Continued

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System I/O Panel

The standard system I/O panel is described here.

See Figure 3-4.

System I/O Connector (J1)

The SYSTEM INPUTS/OUTPUTS connector mounted on the system I/O panel (See Figure 3-5.) includes connections for all of the basic system control input and output signals that will typically be associated with an automated control system.

The cable attached to this connector includes all of the available system control signals, which will be controlled by an output card or output port on the automation controller.

The user can determine which signals to use for each welding application, but with an automatic control system there must be at least one connection to this connector in order to activate the ultrasound output.

Most of the digital output status signals on this connector, are isolated PHOTOMOS relays (signals are not referenced to generator chassis ground). When an output is active, these relays are closed (the output is connected to Isolated Common). This configuration supports PNP and NPN automation inputs, depending on how the common is terminated. The maximum current is 400mA sourced from a 24VDC supply.

All of the input signals on this connector are electrically isolated (signals are NOT referenced to chassis ground) and can be driven from an automation controller output that is either sinking (NPN) or sourcing (PNP), depending upon how the isolated common connection is terminated. Signals are activated when the voltage difference between the signal and the isolated common pin is 24V.

All inputs sink or source 10mA of current from a 24VDC power supply.

Note that a simple switch closure (relay contact) connected to a control input can not activate the input without adding an external power supply to power the input. Adding jumper connections to pins available on the System I/O connector, can configure switch closure inputs to operate referenced to press chassis ground (non-isolated), without adding a separate power supply, if desired.

Refer to *Application Note AN515* (i220 Integrated Press - Automation Interface) at ***http://www.dukane.com/us/DL_ApplData.asp*** for wiring diagrams of example applications.

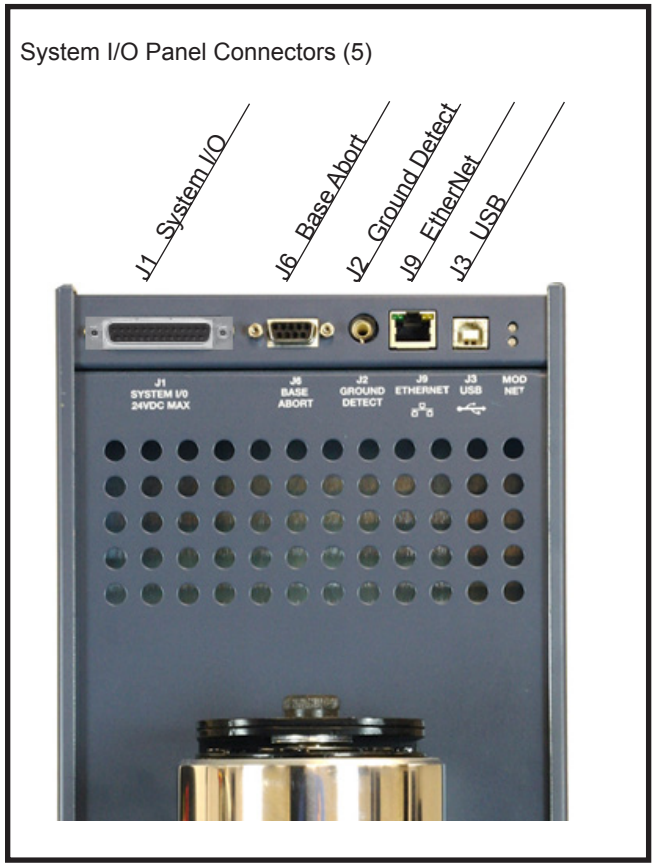

Figure 3-4 System I/O Panel (Standard Panel Shown)

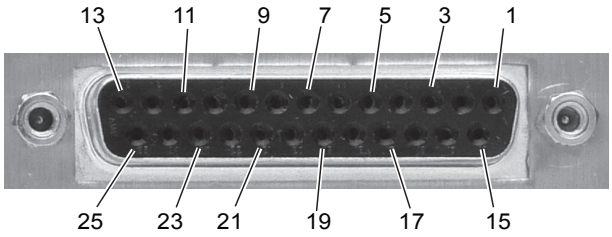

Figure 3–5 DB-25F, Press Input/Output Cable Connector (J1)

Continued

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Pin	Signal Name	Cable Color Code	Description
1	Solenoid Output	BLK	Non-isolated active low digital output that is active from start of a cycle to end of Hold (referenced to chassis ground).
2	In Cycle Status Output	WHT	Isolated output referenced to Output Common that is active from start of a cycle to end of Hold.
3	Front Panel Lockout Input	RED	Isolated input refrenced to Input Common that locks the front panel user interface.
4	READ RELAY NO Output	GRN	Isolated output that is referenced to READY RELAY Common that is active when the press is ready to start a cycle.
5	READY RELAY Common	ORN	Common for READY RELAY NO Output
6	Not Used	BLU	
7	Not Used	WHT/BLK	
8	+22VDC Power Supply	RED/BLK	+22VDC for customer automation controls. Limited to 500mA total for both pins.
9	+22VDC Power Supply	GRN/BLK	+22VDC for customer automation controls. Limited to 500mA total for both pins.
10	Bad Part Status Output	ORN/BLK	Isolated output referenced to Output Common that activates when bad part limit(s) are exceeded.
11	Top of Stroke Status Output	BLU/BLK	Isolated input referenced to Input Common that resets the Any Fault or System Overload status outputs.
12	Not Used	BLK/WHT	
13	Hold Status Output	RED/WHT	Isolated output referenced to Output Common that indicates when in the Hold part of a weld cycle.
14	System latch Reset	GRN/WHT	Isolated input referenced to Input Common that resets the Any Fault or System Overload status outputs.
15	Input Common	BLU/WHT	Isolated input Common
16	+22VDC Power Ground	BLK/RED	+22VDC Power Ground (also chassis ground)
17	+22VDC Power Ground	WHT/RED	+22VDC Power Ground (also chassis ground)
18	+22VDC Power Ground	ORN/RED	+22VDC Power Ground (also chassis ground)
19	Ultrasound Active Status	BLU/RED	Isolated output referenced to Output Common that indicates ultrasound is being output.
20	System Ready Status	RED/GRN	Isolated output referenced to Output Common that is active when the press is ready to start a cycle.
21	Any Fault Status	ORN/GRN	Isolated output referenced to Output Common that is active when the any fault/alarm is detected.
22	Output Common	BLK/WHT/RED	Isolated Output Common.
23	Output Common	WHT/BLK/RED	Isolated Output Common.
24	U/S Activate Common	RED/BLK/WHT	Isolated U/S Activate/Cycle Start.
25	U/S Activate/Cycle Start Input	GRN/BLK/WHT	Isolated input referenced to Isolated U/S Activate/Cycle Start Input Common that starts a cycle when activated.

Table 3-I System Input/Output Connector Signals (J1)

Continued

Continued from Previous Page

System I/O Signal Descriptions (J1)

Pin 1 (Solenoid Output)

This pin is a non-isolated digital active low status output that is active from start of a cycle to end of Hold (referenced to chassis ground).

Pin 2 (In Cycle Status Output)

Pin 2 is an isolated digital NPN/PNP status output referenced to Output Common that is active from start of a cycle to end of Hold.

Pin 3 (Front Panel Control Lock Input)

Pin 3 is used to lock the front panel user interface, so an operator cannot change any welding configuration parameters that are stored in memory. The user can use the interface controls to view welding information, but no changes are allowed. Deactivation of this signal allows normal operation, without any lockout restrictions.

Pin 4 (READY RELAY NO Output)

Pin 4 is the normally open contact of the Ready Relay that is connected to the Ready Relay Common pin when the system is ready to begin a weld cycle. This output will be an open circuit when the welding process controller determines that the next welding cycle cannot be started. This will occur if the system is in cycle, a system fault is active, or the system is off line, but not as a result of a process fault like Overload.

Pin 5 (READY RELAY Common)

Pin 5 is the Ready Relay common pin.

Pin 6 (Not Used)

Pin 7 (Not Used)

Pin 8 (+22VDC Power Supply)

This pin can supply +22VDC.

Pin 9 (+22VDC Power Supply)

This pin can supply +22VDC.

Pin 10 (Bad Part Status Output)

Pin 10 is an isolated digital NPN/PNP status output that activates, either momentarily or until the start of the next welding cycle, when the welding parameters recorded during the previous welding cycle are outside of the programmed bad part limits. This output will be an open circuit when a bad part has not been detected.

Pin 11 (Top of Stroke Status Output)

Pin 11 is an isolated digital NPN/PNP status output that activates when the press/thruster head is in the top of stroke position. This output will be an open circuit when the press/thruster head is not at the top of stroke position**.**

Pin 12 (Not Used)

Pin 13 (Hold Status Output)

Pin 13 is an isolated digital NPN/PNP status output that actives when the press is in the Hold portion of the weld. This output will be an open circuit when the not in Hold.

Pin 14 (System Latch Reset Input)

Pin 14 is used to reset the Any Fault or System Overload status outputs (See Status Output descriptions.). If a fault occurs during a weld cycle, these outputs will normally remain active until the next weld cycle is initiated. Activating this input will reset the status output faults and may simplify automation programming.

Pin 15 (Input Common)

Pin 15 is electrically isolated from chassis ground. Using isolated sourcing (PNP) output drivers, this common line would be connected to isolated ground potential. Using isolated sinking (NPN) output drivers, this common line would be connected to the isolated positive supply voltage output.

Pin 16 (+22VDC Power Ground)
Pin 16 in the 22VDC return and is tied to the system chassis ground.

Pin 17 (+22VDC Power Ground)
Pin 17 in the 22VDC return and is tied to the system chassis ground.

Pin 18 (+22VDC Power Ground)
Pin 18 in the 22VDC return and is tied to the system chassis ground.

Pin 19 (Ultrasound Active Status)
Pin 19 is a digital NPN/PNP status output that activates when the system is delivering ultrasonic power to the load attached to the ultrasound output connector. This output will be an open circuit when the ultrasound output is off.

Pin 20 (System Ready Status Output)
This status output signal will activate only when the system is ready to activate ultrasound or begin a weld cycle. Pin 22 is a digital status output that activates when a weld processing cycle is completed and the welding process control system is ready to start the next welding cycle. This output will be an open circuit when the welding process controller determines that the next welding cycle cannot be started. This includes system faults or off line active, but not a process fault like Overload.

Pin 21 (Any Fault Status Output)
Pin 21 is a digital NPN/PNP status output that activates whenever any fault condition is detected that inhibits ultrasound output and normal system operation. This output will be an open circuit when no system fault conditions are detected. In the case of an overload, this output stays active until the start of the next cycle or until cleared using the front panel keypad or system input Pin 12 (System Latch Reset input).

Faults that will activate the Any Fault output:

- Overload (Average, Peak, or Frequency)
- Overtemperature Fault
- System Power Fault

Pin 22 (Output Common)
Pin 22 is electrically isolated from chassis ground. This common line should be connected to the negative output of a user-provided isolated 24VDC power supply for a PLC sourcing input card. For a PLC Sinking input card this line is connected to the positive output of the isolated 24VDC power supply.

Pin 23 (Output Common)
Pin 23 is electrically isolated from chassis ground. This common line should be connected to the negative output of a user-provided isolated 24VDC power supply for a PLC sourcing input card. For a PLC Sinking input card this line is connected to the positive output of the isolated 24VDC power supply.

Pin 24 (Ultrasound Activation/Cycle Start Common)
Pin 24 is electrically isolated from chassis ground. Using sourcing (PNP) output drivers, this common line would be connected to the automation system ground potential. Using sinking (NPN) output drivers, this common line would be connected to the automation system positive supply voltage output.

Pin 25 (Ultrasound Activation/ Cycle Start Input)
Pin 25 is used to start a weld cycle. Depending on the welding process controller setup, this input signal could be activated momentarily to start a welding cycle.

Continued

Base/Abort Connector (J6)

The Base/Abort connector accepts the operate and emergency stop signals from the optical operate switches and abort switch on the base (J35 - Base Interface Connector). If you are using custom automation, you may have separate operate and abort switches, but these still connect to the Base/Abort Connector (J6).

See ***Installing the Press System Without its Machine Base*** on Page 30.

Ground Detect (J2)

To activate Ground Detect connect a ground cable to J2, and make sure the feature is activated by using the Weld menu.

Generally the Ground Detect feature is used to sense when the horn contacts an electrically isolated anvil. Ground Detect Input is connected to the electrically isolated anvil. When the horn, which is always at ground potential, contacts the anvil, the ground detect input is activated. The weld portion of the cycle is then terminated. The system will not start a new cycle until the ground detect input is deactivated.

Isolate the fixture as it is fastened to the press base plate by completing the three numbered steps shown in Figure 3-6 below.

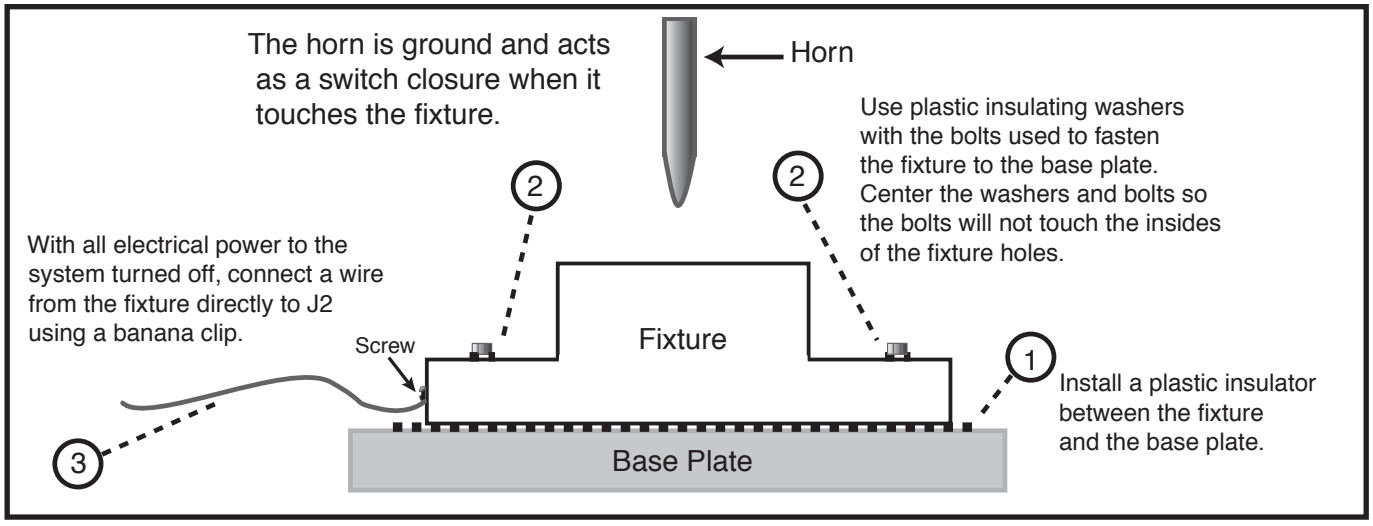

The horn is ground and acts as a switch closure when it touches the fixture.
Horn
Use plastic insulating washers with the bolts used to fasten the fixture to the base plate. Center the washers and bolts so the bolts will not touch the insides of the fixture holes.
2
2
With all electrical power to the system turned off, connect a wire from the fixture directly to J2 using a banana clip.
Screw
Fixture
1
Install a plastic insulator between the fixture and the base plate.
3
Base Plate

Figure 3-6 Ground Detect Fixture Installation

EtherNet (J9) (Dukane Use Only)

USB (J3) (Dukane Use Only)

Base Connections

Grounding Stud

This connector is shown as Ⓐ in Figure 3-7. Use this base connector to insure proper grounding.

See RFI grounding below, and the grounding material on Page 9.

J35 - Ergonomic Base Connector

This connector is shown as Ⓑ in Figure 3-7. It is used to interface the base controls and display to the Base/Abort connector (J6) on the thruster. See Figure 3-4 for the J6 location.

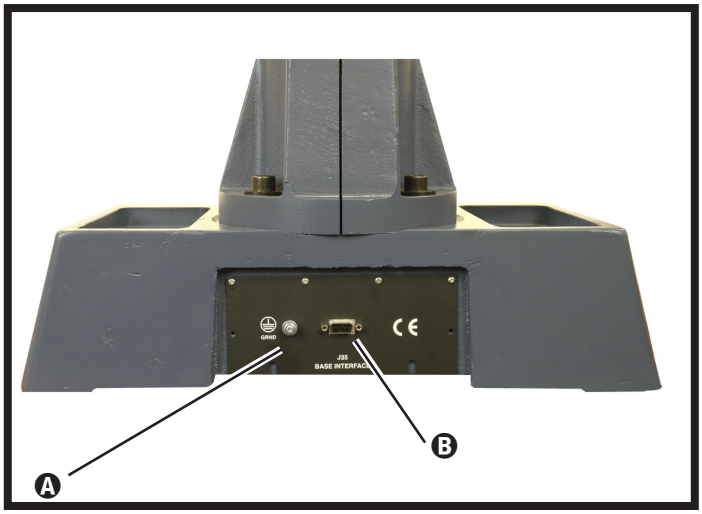


Figure 3-7 Press Base Rear - Grounding Stud and J35 the Base Interface Connector

RFI Grounding

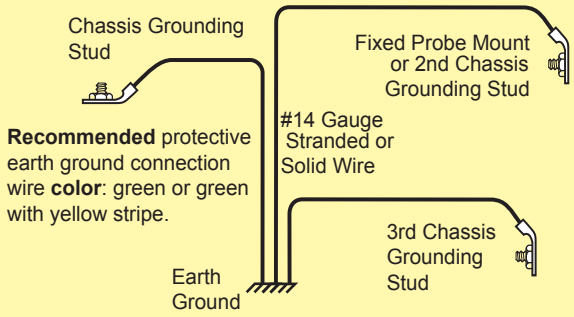
The i220 Press provides the operating power and power returns. Make sure the press is grounded properly.

In addition to the safety considerations, proper grounding is essential for the effective suppression of RFI (Radio Frequency Interference). Every press contains a RFI filter which blocks noise on the AC power line from entering the control circuitry. This filter also prevents ultrasonic RFI from being fed back into the AC power line.

If you experience problems with RFI from the press, run an additional grounding wire from the press base grounding stud to the nearest grounded metal pipe or equivalent earth ground by means of a ground clamp. Use at least 14 AWG wire for the connection to the press base.

CAUTION

To minimize electrical noise and eliminate ground currents, ground the chassis as shown. Use a STAR configuration (illustrated below). Do not DAISY CHAIN the grounds.


Chassis Grounding Stud
Fixed Probe Mount or 2nd Chassis Grounding Stud
#14 Gauge Stranded or Solid Wire
Recommended protective earth ground connection wire **color**: green or green with yellow stripe.
3rd Chassis Grounding Stud
Earth Ground

Connecting Press Cables

The press is not equipped with its own source of compressed air, or electrical power. The end user supplies compressed air, electrical power, and system I/O connections needed for end user applications.

Figure 3-8 to the right indicates locations for press connections.

Basic Connections

1. **Ground the press chassis** with the supplied 14-Gauge wire, and attach it to the grounding stud. See Figure 3-xx.
2. **Connect compressed air** to the air supply source connector. This is a 1/4 NPT threaded receptacle for a compressed air supply that provides the thruster with the required pressure of 80-110 psi (5.4 - 7.5 atmospheres) to operate the pneumatic system. See the CAUTION about compressed air on the next page.

   This connector is attached to a safety isolation lockout valve and then to an air filter. (See Pneumatic Safety, Page 10.)
3. **Base/Abort Cable (J6) -** Connect this cable to the press base plate connector (J35) or automation equipment**.**
4. **Connect the A.C. power cord** to the IEC power inlet connector on the press, and plug the other end into an approved AC outlet.

Additional Connections

In addition to basic connections listed above:

- **Provide for other System I/O Pane**l connections as needed. These include:

  J1 - System I/O;

  J2 - Ground Detect;

  J9 - EtherNet (DUKANE USE ONLY);

  and, J3 - USB (DUKANE USE ONLY).

Figure 3-8 Press Connections

Power Cords

The AC line cords supplied are matched to the ultrasonic output power rating and the continent of specified use. See Table 3-II below.

CAUTION

The compressed air for the thruster must be clean, dry and oil free. Any particulate, oil contamination or moisture can coat or clog the valves, sensors and cylinder walls. This can result in premature failure of the regulator, pressure transducer, air cylinder or other components of the pneumatic system.

CAUTION

The power cord is equipped with a three-prong, grounded-type plug for your safety. Whenever a two-slot receptacle is encountered, we strongly recommend that it is replaced with a properly grounded three-lead receptacle.

Have a qualified electrician do the replacement in accordance with the National Electrical Code and local codes and ordinances. DO NOT cut off the power cord grounding prong or alter the plug in any way.

Continent of Use	Power Cord Part Number	Power
North America	200 - 1110	240V, 15A
	200 - 1541	240V, 10A
Continental Europe	200 - 1111	240V, 16A
	200 - 1542	240V, 10A

Table 3-II Power Cords

NOTE

Under normal usage, do not apply more than 24 VDC @ 2 Amps to the contacts at J1.

Press Height Adjustment

The height of the thruster on the column is adjustable. Adjustment is made by first turning the two handles located on the right rear side of the press.

- To loosen the grip on the column, turn the handles counterclockwise, as shown in Figure 3-10a. The counterbalance spring on the column supports the weight of the thruster while the handles are loose. Depending on horn weight, the press may rise up unexpectedly, so be careful to avoid injury.
- Adjust the column to the desired height.
- Turn the handles clockwise, as shown in Figure 3-10b, until tight.
- To rotate the handles out of the way without loosening or tightening, pull the handles outward, rotate and release, as shown in Figure 3-11.

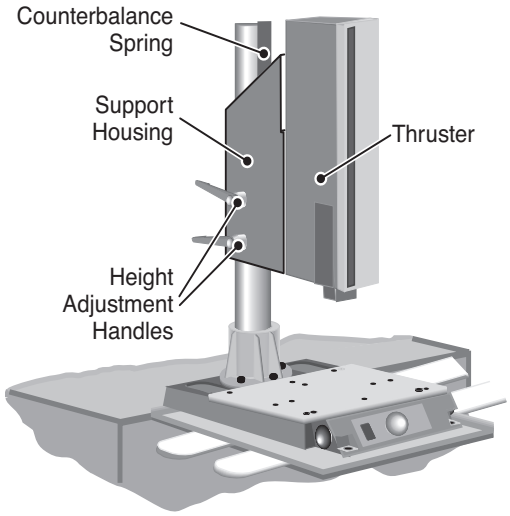
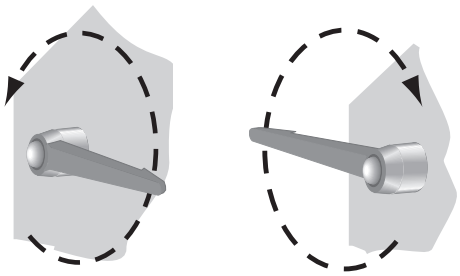


Figure 3-9 Example of Press Placement

CAUTION

Exercise caution if a thruster is not installed on the support housing. The counterbalance spring on the unloaded housing may cause the assembly to rise up unexpectedly when the height adjustment handles are loosened.



(a) – Loosen **(b)** – Tighten

Figure 3-10 Using Handles to Make Adjustments

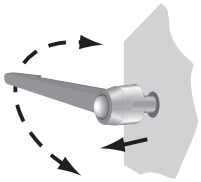


Figure 3-11 To Relocate Handles

Installing the Press System without Machine Base

Configuration of the press system without its machine base, means that installation is somewhat different from a machine base equipped press.

There are three primary differences :

1) **Securing the Base Flange** - In this case, the base flange will have to be secured to a rigid, level stationary structure. We recommend using socket-head cap screws M12 -1.75 with a minimum length of 40 mm for securing the flange to the supporting structure. We recommend a minimum of 1 inch (25.4 mm) full thread engagement of the cap screws into the supporting structure. Depending upon the thickness and material of the supporting structure, longer screws and/or additional hardware may be required.

A full scale flange template is provided for locating and drilling holes in the supporting structure. The template is Figure 3-20 on the next page.

2) **Operate and E-STOP Signals** - Because there is no machine base as the press is equipped in its standard configuration, operate and emergency stop signals will not be generated by the optical switches and the E-STOP/Abort switch that are parts of the standard press base.

These signals will be generated by user-supplied external sources.

Connect a Dukane cable - Part Number 200-1546-xxM - from the J6 connector on the System I/O Panel to user-supplied automation equipment.

See ***Automation System*** for more information about the user-supplied requirements for this connection on the next page.

Automation System

User-supplied automation equipment connects to the press System I/O Panel through:

- J1, a 25-pin connector, and
- J6, a 9-pin connector.

J1 - User-supplied external controls provide the press with input/output signals that direct operation of the press.

Table 3-I - System Input/Output Connector Signals - shows the 25-pin connector's input and output signal names.

See Pages 21-23 for signal descriptions.

J6 - Attach the finished end (9-pin female connector) of Dukane cable Part Number 200-1546-xxM** to J6 on the Press System I/O Panel. With the open end of the cable the user can make connections from user-supplied equipment to provide for the functions the Dukane cable typically has. See the table below.

Pin No.	Type	Function	Signal Description
1	Input	Activation Switch 1 N.O.	Normally Open (N.O.) dry contact closure to Pin 7
2	Input	Activation Switch 2 N.O.	Normally Open (N.O.) dry contact closure to Pin 7
3	Input	Hardware Abort Power In	Normally Closed (N.C.) emergency switch contact
4	Input	Software Abort	Normally Open (N.O.) dry contact closure to ground
5	Ground	Internal Ground	Internal Ground (Gnd)
6	Input	Activation Switch 1 N.C.	Normally Closed (N.C.) dry contact closure to Pin 7
7	+22VDC	Switch Power Out	Power for switches when abort inactive.
8	Input	Activation Switch 2 N.C.	Normally Closed (N.C.) dry contact closure to Pin 7
9	+22VDC	Hardware Abort Power Out	Normally Closed (N.C.) emergency switch contact

Table 3-III Dukane Cable 200-1546-00 Signals

** xxM = A value representing cable length in Meters.
This number is typically determined when ordering the equipment.

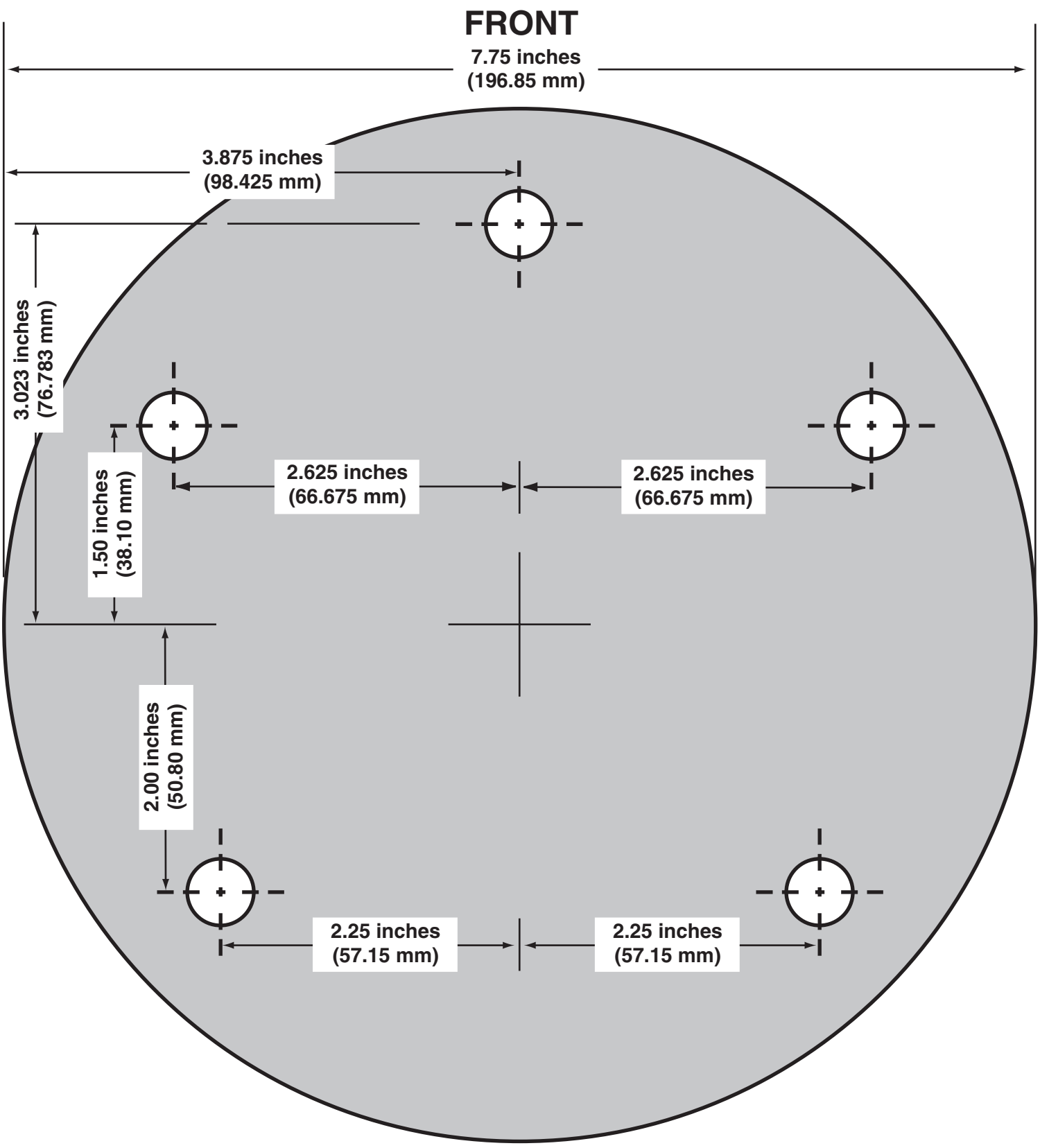


Figure 3-12 Flange Template

No Scaling - Actual Size

Flange Template

SECTION 4

Controls

Front Panel Controls. 35
System Operating Mode Keys. 36
Navigation Keys 37
Soft Keys Bordering the Display 37
Hot Keys. 38
System Power Output Level. 39
Screen Basics 40
Press Controls. 41
Manual Thruster Controls 41
Indicators 43
Press Ergonomic Base 45

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Front Panel Controls

This section introduces the ***iQ Series*** ultrasonic integrated press system control panel and LCD display with this information:

- Functions of the panel components shown in Figure 4-1 below are discussed.
- These screen basics are introduced:
  - — Making selections,
  - — Interpreting on-screen arrows,
  - — Taking a look at setup identification.

NOTE

Do not touch the display.
Touch only the keys that are on the front panel.

Cleaning - If the display is dirty, clean it by first putting a mild cleaning solution on a clean, soft cloth. Then, gently wipe the cloth over the screen.

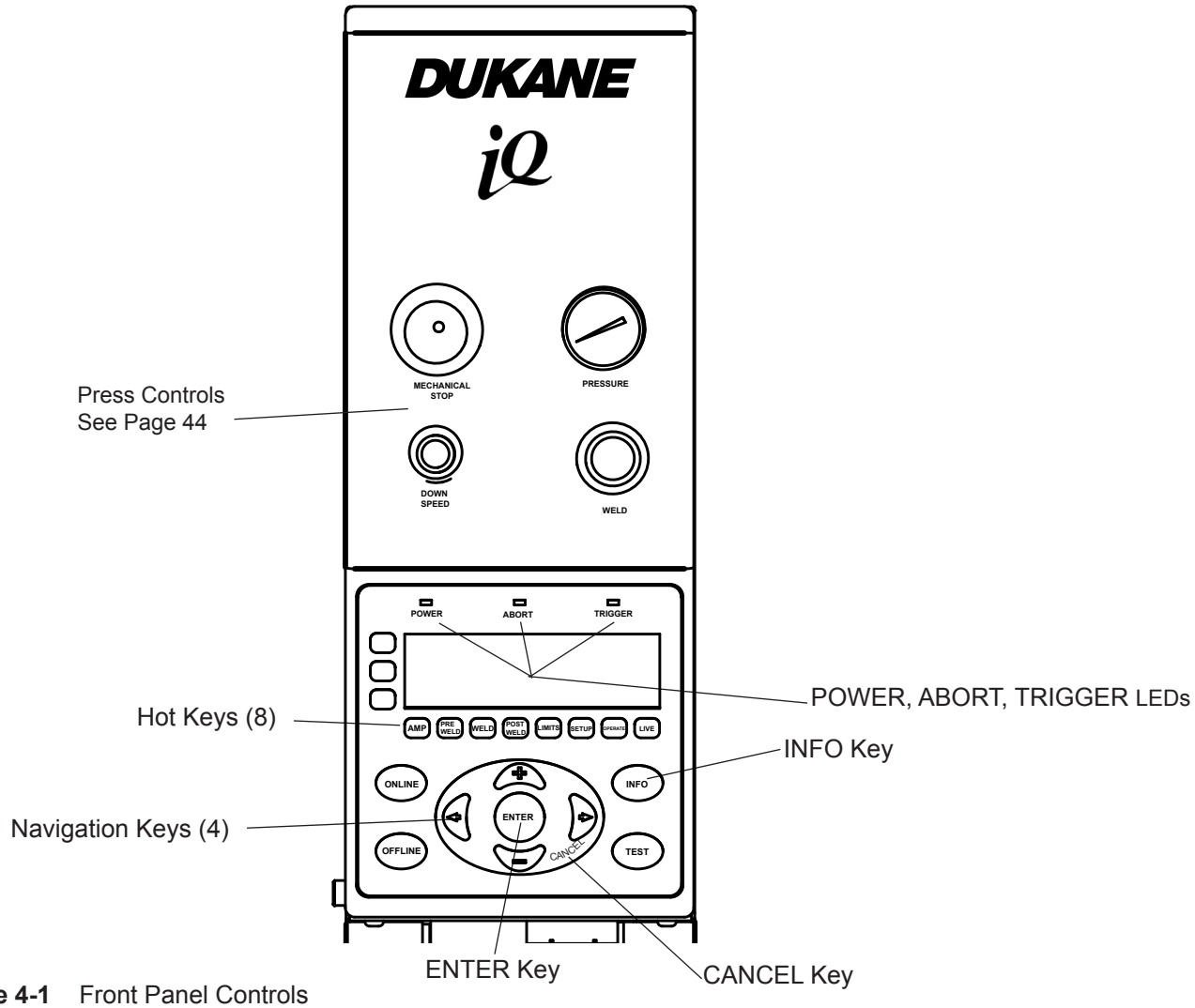

Figure 4-1 Front Panel Controls

System Operating Mode Keys

ON LINE - After AC power has been activated and the press is operating normally, ON LINE is the normal operating mode. The press can produce ultrasound signals in this mode.
The word, Online appears in a white outlined box in the upper right of the display.

TEST - After AC power has been activated and the press is operating normally, in the ON LINE mode, the TEST key can be pushed.

This activates a momentary ultrasound pulse allowing the operator to test system function. The display will show the real time settings for Amplitude, Power, Operating Frequency, and Distance (does not appear if distance is not supported). This information is useful in troubleshooting.

While pushing the TEST key, look at the System Power Output Level bar graph (See Figure 4-3.) There should be at least one segment lit.

IMPORTANT - If more than three segments are lit, with no load applied to the ultrasonic stack, make sure the stack is properly assembled and not damaged. During normal operation, the peak level LED segment remains lit (approximately 1 second) until the next cycle begins.

OFFLINE - After AC power has been activated and the press is operating normally, the OFFLINE key may be pressed to put the press into the offline mode. In this mode the press can not generate an ultrasound signal.

However the press can still run a cycle while OFFLINE. This can be useful to check the rest of the mechanical weld setup including the speed, air pressure and trigger point settings.

The word, Offline appears in a white outlined box in the display's upper right corner.

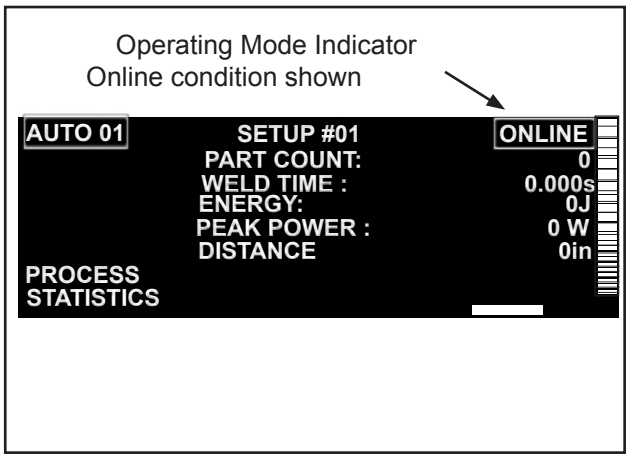

Figure 4-2 Display Detail, Operating Mode Indicator

CAUTION

If a transducer is not connected to the ultrasound output connector, the system should be set to the OFFLINE mode. Do not activate the ultrasound output without a transducer connected. Make sure that the stack is properly assembled before it is connected to the system. The horn should never come in direct contact with a metal fixture or anvil with ultrasound activated.

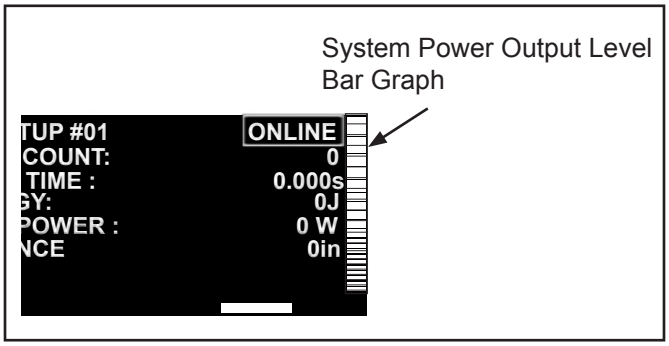

Figure 4-3 Display Detail, Power Output Level

Navigation Keys (4)

Moving the Cursor - Press the **left and right navigation** (⟵ ⟶) keys to move the display's cursor left or right respectively.

Press the **up and down navigation keys (+ or -)** to scroll through menu lists. Also, use the ⟵ ⟶ keys to move to a digit and change the value of a selected digit with the + or - keys.

ENTER Key

Press ENTER to confirm and store a selection in memory.
Example: After entering a time value, press ENTER.

CANCEL Key

Press the CANCEL key to stop editing a value without saving changes to the value or to leave secondary menu screens.

INFO Key

Press the INFO key, and the menu shown to the right in Figure 4-5 appears.

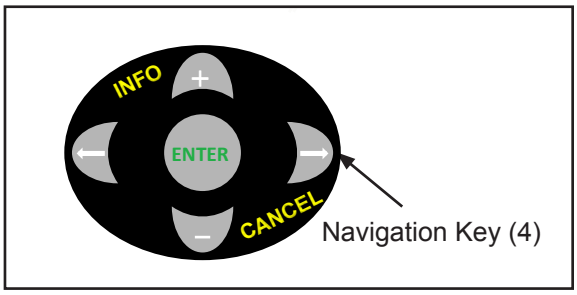

Figure 4-4 Navigation Keys (4), with Enter, Info and Cancel

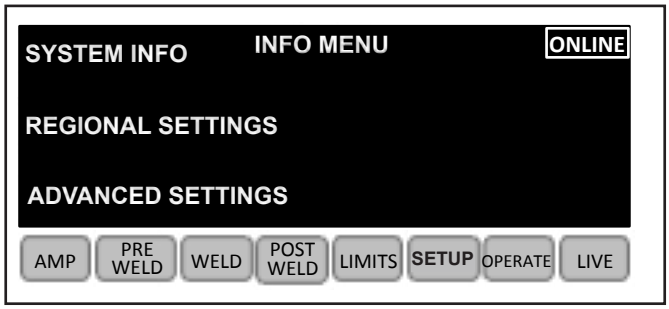

Figure 4-5 Info Menu Display

NOTE
For more information about the INFO menus, please see ***Section 5 - Operation***.

Soft Keys Bordering the Display (3)

Use the three keys bordering the left side of the display to make selections from the choices shown on the display.

Not all keys will be active on any given screen.

Example: For the display shown in Figure 4-6 below, two of the three soft keys are active:

Weld, and **Afterburst**.

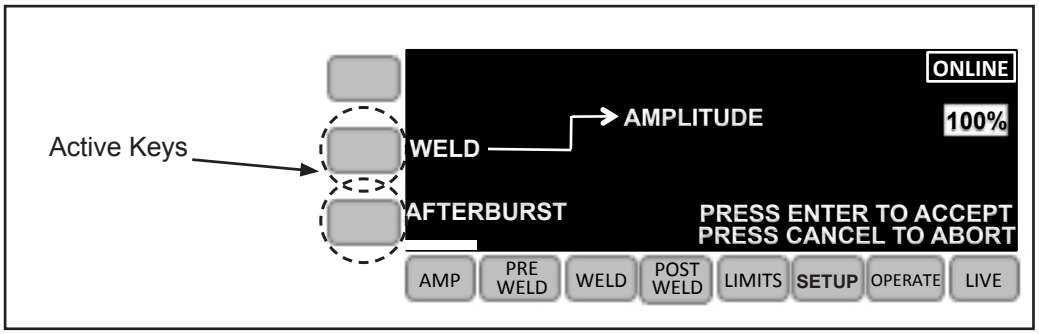

Figure 4-6 Active Soft Keys, Example

Continued

Hot Keys (8)

Each of the eight hot keys under the display, when pressed, brings up one of these portions of the menu:

- AMP - Adjust amplitude for Weld, Pre-Trigger and Afterburst portions of the weld cycle.
- PRE-WELD - Select operating Mode; enable or disable Pre-Trigger; and, select Trigger type, trigger maximum time, and trigger delay.
- WELD - Choose weld type (time, energy, distance, position or ground detect).
- POST WELD - Set parameters for Hold and Afterburst parts of the cycle.
- LIMITS - Set which weld characteristics to be displayed, and which will have their bad part part limits enabled.
- SETUPS - This is a display only screen showing the setup (weld parameters).
- OPERATE - This is a display-only screen showing cycle data from the last cycle. Only those selected to be displayed or have process limits set will be shown.
- LIVE - This is a display-only screen showing real time Amplitude, Power, Operating Frequency, and Position. (If position is not supported, it is not displayed.)

See the next section, OPERATION for more detail on the functions of these hot key sub-menus.

NOTE

The white bar along the bottom of the LCD display is positioned above the Hot Key menu that is being displayed.

System Power Output Level
(Bar Graph)

A bar graph displays the percentage of ultrasonic power being drawn by the load. See Figure 4-7 to the right.

Peak Detect Feature

To indicate the maximum peak power achieved during a weld cycle, the segment in the bar graph corresponding to the peak level remains on (for about one second) after the weld cycle has been completed.

Bar Graph Power Scaling

Power scaling is related to amplitude. At 100% amplitude the whole graph is lit, and the press is operating at 100% power. At 50% amplitude the entire graph is lit, and the press is operating at 50% power.

If the amplitude setting is lowered, the graph rescales automatically according to the revised amplitude.

Example: With a 1200W press, at 50% amplitude, if the whole graph is lit, that represents 600W.

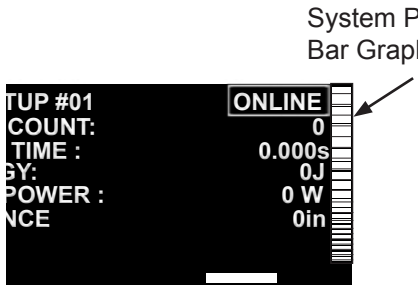

Figure 4-7 Display Detail, Power Output Level

CAUTION

If there is an overload fault verify that the ultrasonic stack is not damaged.

Power LED

The front panel POWER LED glows after the rear panel AC power switch/circuit breaker is turned ON:

On start-up, the light flashes GREEN for a few seconds, and then turns steady GREEN. This indicates AC power has activated the press.

When the AC power switch is turned to the OFF position, the front panel POWER LED goes out indicating the press no longer has power.

NOTE

Go to ***Section 5 - Operation, Start-up Sequence*** for an explanation of the press start-up sequence.

Screen Basics

Making Selections

Figure 4-8 below shows there are several ways to show that an item has been selected:

- An area of white highlights a selected item.
- The cursor shows what digit is selected.

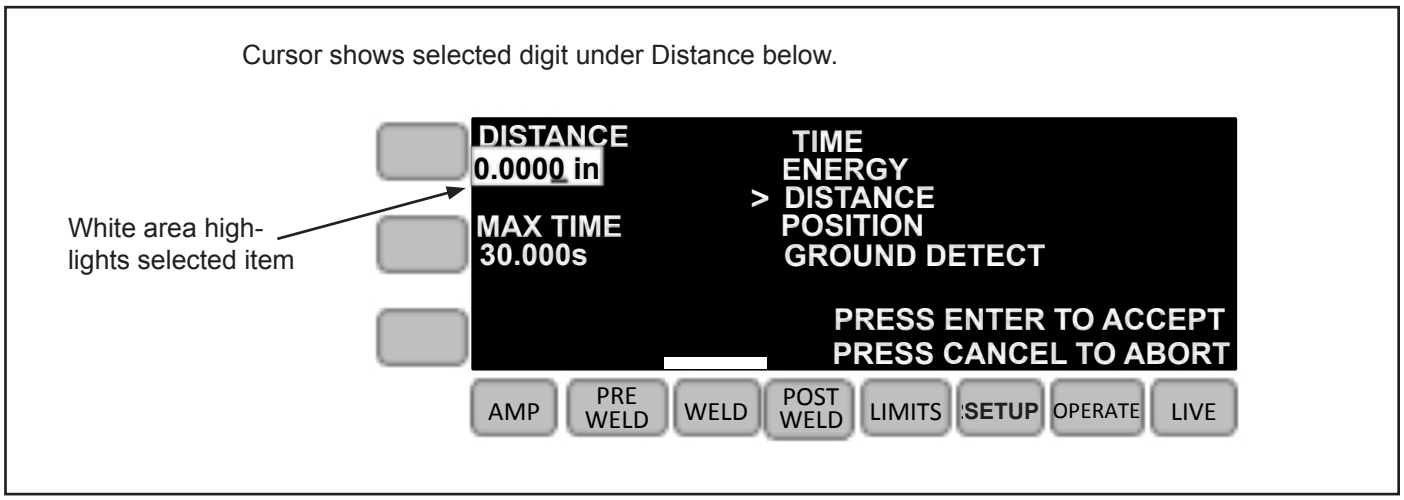

Figure 4-8 Making Selections

Interpreting On-screen Arrows

Arrows pointing up and down, give visual cues that more text is available in the direction the arrow points. An example is shown below in Figure 4-9. For this screen, the + and - (up or down) navigation keys are used to move in the direction of the on-screen arrow.

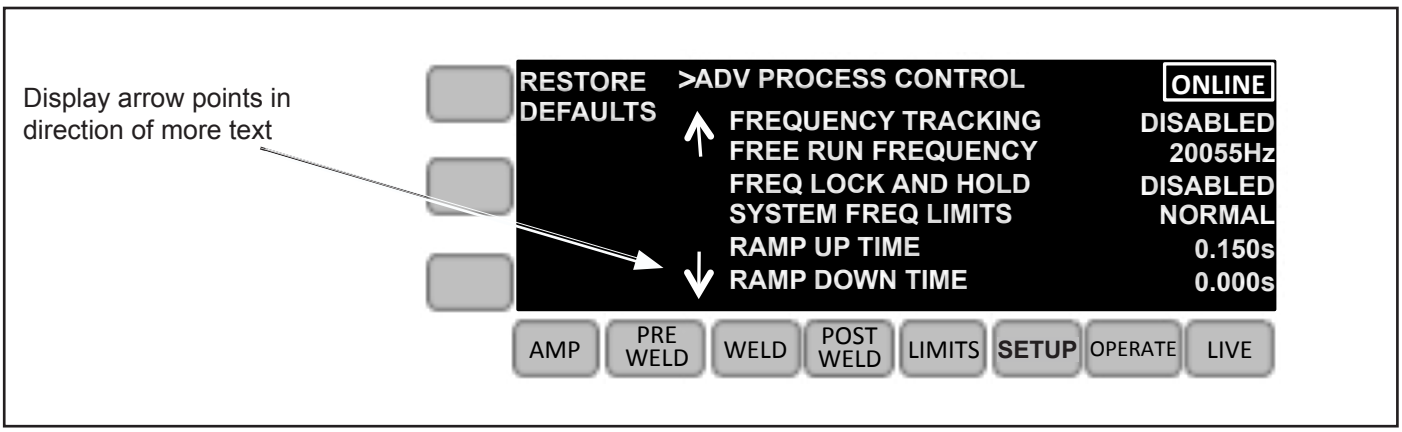

Figure 4-9 Arrows Indicate Direction of More Text

Press Controls

This section describes the manual controls, indicators and features of the Press/Thruster System.

If desired, the controls on the front of the thruster can be used to manually set parameters for a given process.

Features used on the control panel are:

- Indicators associated with the controls to provide a visual indication of the control settings.
- Metric measurements

Manual Thruster Controls

Refer to Figure 4-10 for the location of the controls.

Mechanical Stop Adjustment

The function of the mechanical stop is to halt the downstroke at a predetermined point. It is used in two ways:

- To stop the downstroke at a particular depth of travel relative to the fixture/anvil.
- To prevent the horn from contacting the fixture when there is no part present. This prevents possible damage to the horn and/or fixture. Never allow the horn to contact the fixture while ultrasonic power is applied to the horn. Metal–to–metal contact can void the horn and/or tooling warranty.

The Mechanical Stop position may be locked by tightening the lock screw located on the left side of the press. Once locked, it will be difficult or impossible to turn the Mechanical Stop Adjustment Knob on the front panel.

Down Speed Adjustment

This control adjusts the downward velocity of the press/thruster slide assembly. Turning the knob clockwise decreases the speed. Turning it counterclockwise increases the speed of descent.
There is a locking ring at the base of the Down Speed knob to lock the knob and prevent it from turning.

Weld (Pressure Regulator)

The weld (pressure regulator) knob is used to set the amount of air pressure applied to the air cylinder during the press downstroke, the weld, and the hold cycle.

NOTE

Total Stroke = 7 inches (177.800mm)

This is the thruster's maximum available distance of travel.

CAUTION

Do not allow the horn to contact the fixture while ultrasonic power is applied to the horn. Metal–to–metal contact can void the horn and/or tooling warranty.

Continued

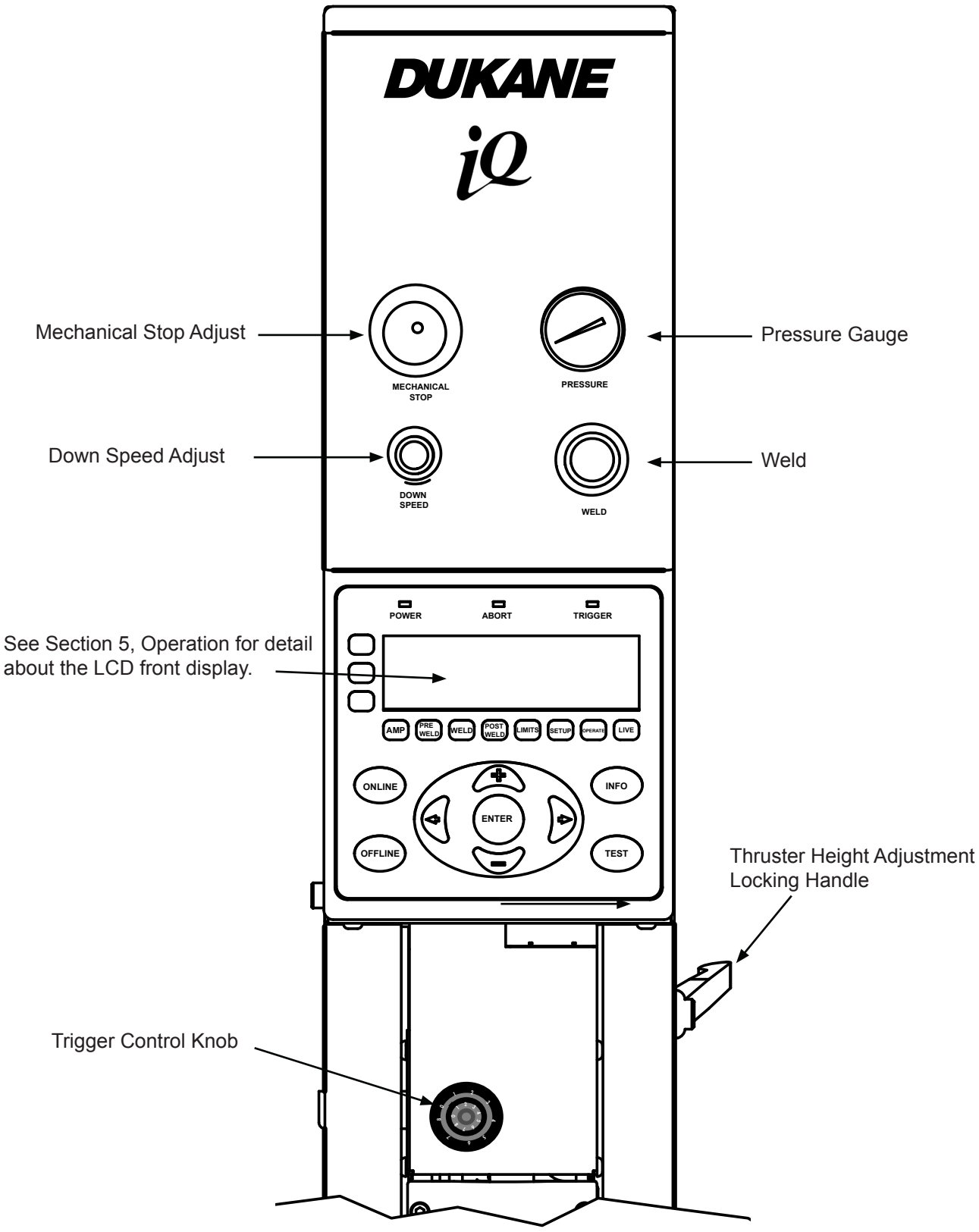

Figure 4-10 Press Controls and Indicators - Front View

Continued from Page 41

Trigger Control

Setting the trigger control determines the amount of preload or force on the part before turning on the ultrasonics.

(Numbers displayed are for reference only.)

A pressure switch in the slide assembly closes when a specific amount of force applied to the horn is reached. The trigger control adjusts the amount of force needed to close that pressure switch. When the switch closes, the ultrasound signal starts, and the horn begins to vibrate.

See Figure 4-11 for trigger knob detail.

To make adjustments, grasp the inner knob, and turn it to make adjustments. This knob can be turned as many as nine revolutions. Each revolution advances the outer dial one number in the direction the knob was turned. A lever between the scales locks the control in position.

The numbers on the scale give the operator only a relative reading. A higher setting indicates more preload force (on the part before the ultrasound signal is turned on). A lower setting means less force.

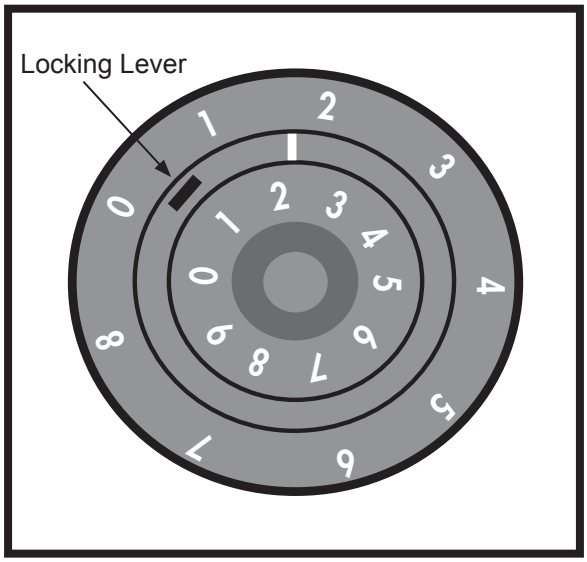

Figure 4-11 Trigger Control Knob

Indicators

Pressure Gauge

The pressure gauge shows the amount of air pressure applied to the upper portion of the air cylinder for the weld-and-hold operation.

Stroke Position Indicator Flag

The stroke position indicator flag is not preset prior to press operation. It moves with the slide assembly as the assembly moves down and up.

Mechanical Stop Indicator Flag

This setting indicates where the downstroke will end.

Continued

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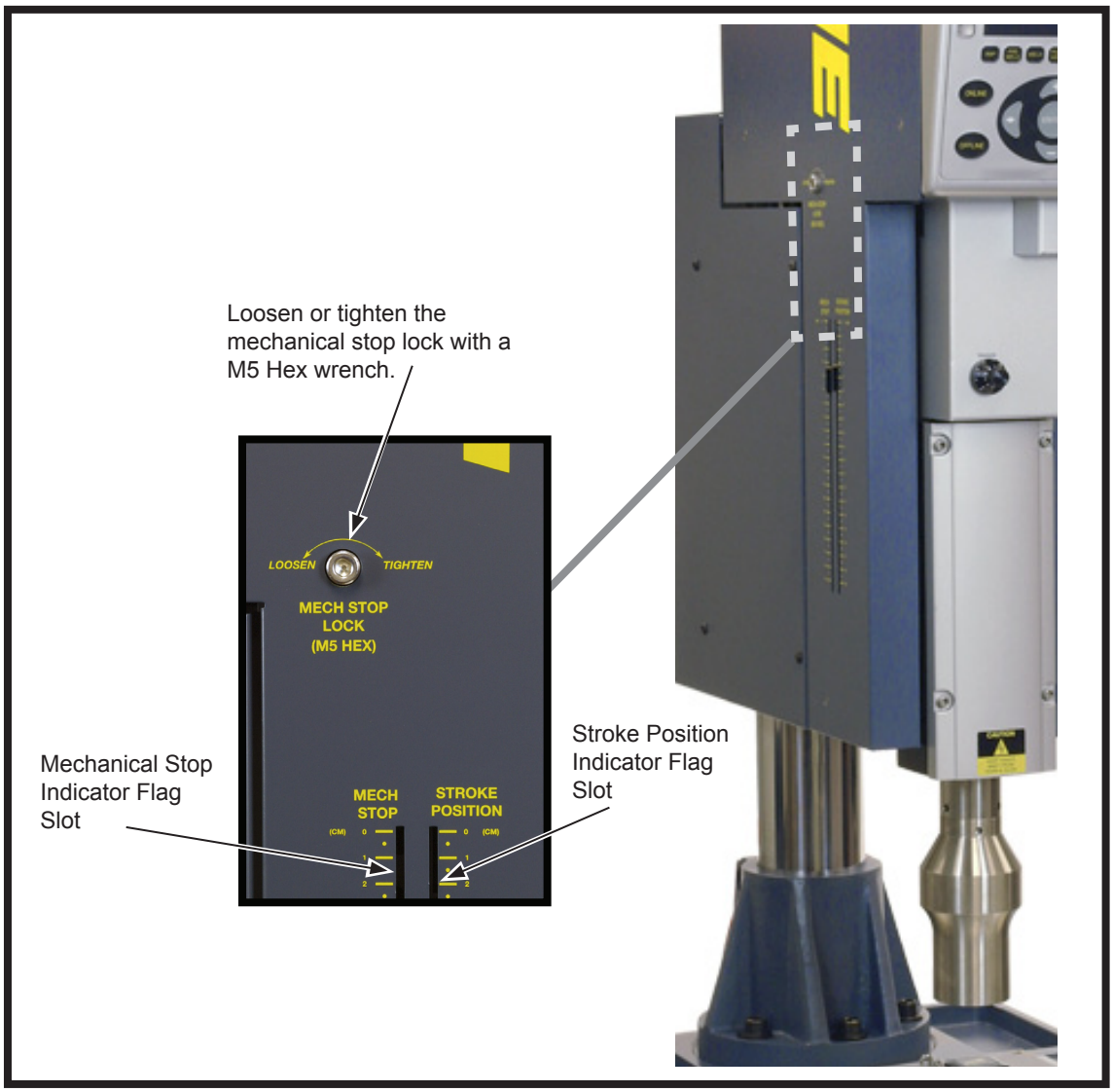
Loosen or tighten the mechanical stop lock with a M5 Hex wrench.
LOOSEN
TIGHTEN
MECH STOP LOCK (M5 HEX)
Mechanical Stop Indicator Flag Slot
MECH STOP
STROKE POSITION
Stroke Position Indicator Flag Slot

Figure 4-12 Press Left Side View with Detail

Continued

Press Ergonomic Base

The ergonomic base, shown in Figure 4-13, consists of a base plate, cycle activation switches (black finger switches), abort switch (red palm switch). At the back of the base is a cable connector for an interface between the i220 thruster and the base front panel.

Base Plate

The machined base plate is bolted to the top of the ergonomic base. It has drilled and tapped holes that line up with leveling screws in the fixtures to allow easy fixture leveling for alignment with the horn. For details on the alignment and leveling of the base plate, see ***Section 7: Acoustic Stack/Fixture Setup***.

NOTE

The actual amount of force applied to the part depends on the following four factors:

- The setting of the regulator(s)
- The area of the air cylinder
- The mass of the horn used
- The surface area of the horn

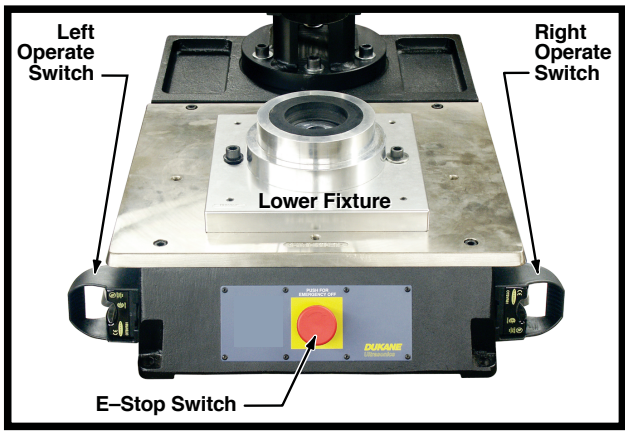

Figure 4-13 Ergonomic Base Controls

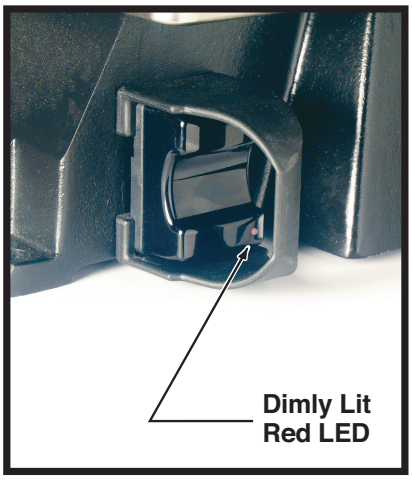

Figure 4-14 Right Operate Switch in Standby Mode, One LED Dimly Lit

Figure 4-15 Right Switch in Operate Mode, Both LEDs Brightly Lit

WARNING

Any modifications to the Activation Switch (also known as the Operate Switch) circuit must comply with all OSHA and ANSI requirements. Compliance with all local building and electrical codes is also required.

Dukane Corporation does not assume any responsibility or liability for circuitry modifications made by the customer or by any third party manufacturer.

Activation (Operate) Switches

Located on either side of the base are two optical (RUN) switches. These are shown in Figure 4-13. These switches use Infrared (IR) sensors. They comply with OSHA and CE safety standards. Both switches are identical.

Each optical–touch switch has a small red LED that is dimly illuminated whenever the power is on, as shown in Figure 4-14. When the operator places a finger in the tray, the LED brightens and a second LED in the opposite corner of the tray illuminates to indicate the switch has been activated as shown in Figure 4-15. Both switches must be activated simultaneously to initiate a weld cycle.

Emergency Stop (Abort) Switch

A red Emergency–Stop (E-STOP) switch is located in the center of the base as shown in Figure 4-13. The emergency stop switch must be in its reset position before the operate switches will function.

To reset the Emergency Stop, twist the large red button about 45 degrees to the right, which will cause the button to spring out. This is shown in Figure 4-16.

The abort switch applies 24 VDC power to the thruster/press. Pressing the abort switch causes the press to:

- Immediately turn off the ultrasound,
- Remove electrical power from the press, and
- Initiate a software abort sequence.

Front Panel Status LEDs

The function of these LEDs is to indicate the status conditions of the press:

- **POWER** - A green POWER status light indicates that power is applied to the press, and it is ready for operation.
- **ABORT** - When the E-STOP (abort_ switch is pushed in, the red ABORT status indicator illuminates. Press operation is no longer possible.
- **TRIGGER** - The blue Trigger light comes on whenever Ultrasound turns on. It is activated by the Trigger Switch or at the beginning of the weld cycle if "Pre-trigger" is enabled.

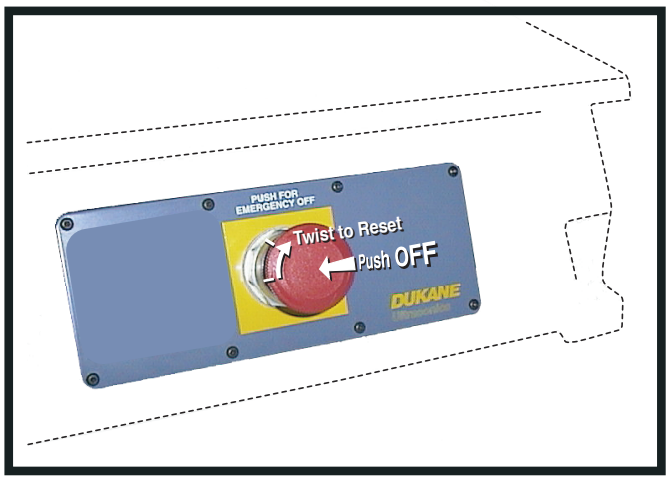

Figure 4-16 Setting and Resetting the E–STOP

WARNING

Any modifications to the Emergency Stop Switch (also known as the E-STOP or Abort Switch) circuit must comply with all OSHA and ANSI requirements. Compliance with all local building and electrical codes is also required.

Dukane Corporation does not assume any responsibility or liability for circuitry modifications made by the customer or by any third party manufacturer.

SECTION 5

Operation

Press Start-up Sequence 49
Stopping the Weld Cycle 50
Using the Menus. 51
AMP 52
PRE-WELD 53
WELD 55
POST-WELD 56
LIMITS 57
SETUP. 58
OPERATE 59
LIVE. 60
Using the INFO Menus 62
Alarms 69

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Press Start-up Sequence

1) Press the rear panel AC breaker switch to ON. See Figure 5-1.
2) The front panel POWER light (See Figure 5-2.) will flash GREEN a few times, then will glow a steady GREEN.

   The display's initial screen identifies the Dukane ***iQ*** Integrated Press and its major components.

   The start-up sequence ends when the OPERATE screen is displayed.

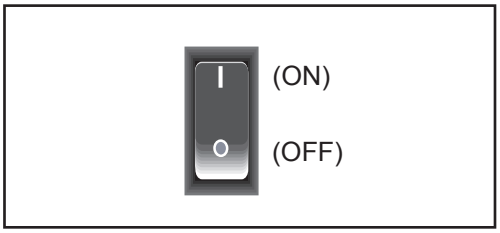

Figure 5–1 Rear Panel AC Breaker Switch

NOTE

Press, acoustic stack, and tooling will require their own individual adjustments as those components are integrated into your particular system.

Helpful information on a wide variety of assembly equipment, processes and techniques can be found at the Dukane website:

http://www.dukane.com/us/PPL_upa.htm

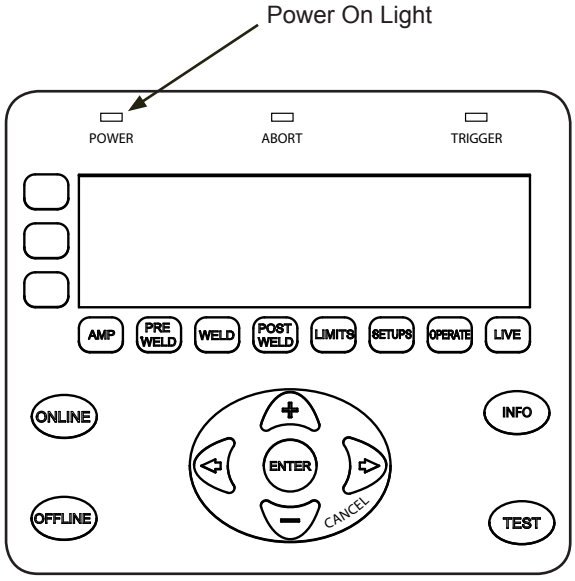

Figure 5–2 Front Panel with Power On Light

Stopping the Weld Cycle

Normal Conditions

The cycle stops when the programmed welding cycle ends.

Emergency Conditions

Manual System

Do one of these things:

1) Press the red Emergency Off (E-STOP) switch (also called the Abort switch.) located on the press base.
2) Press the OFFLINE front panel key to stop the ultrasound signal. This may be done under any condition.

OR,

3) If the press front panel power light is on (GREEN), move the rear panel AC breaker switch to the OFF position. The front panel power light will go out as power is cut off.

Automated System

Customer-supplied external controls provide the means to stop the cycle for an automated system.

The 200-1546-xxM cable can be used to connect these external controls to the I/O panel at connector J6.

See Page 30 for more information.

Using the Menus

The figure below provides an overview for the menu structure and a beginning page number reference for the item. The user can access the menus through the front panel eight hot keys and through the INFO key.

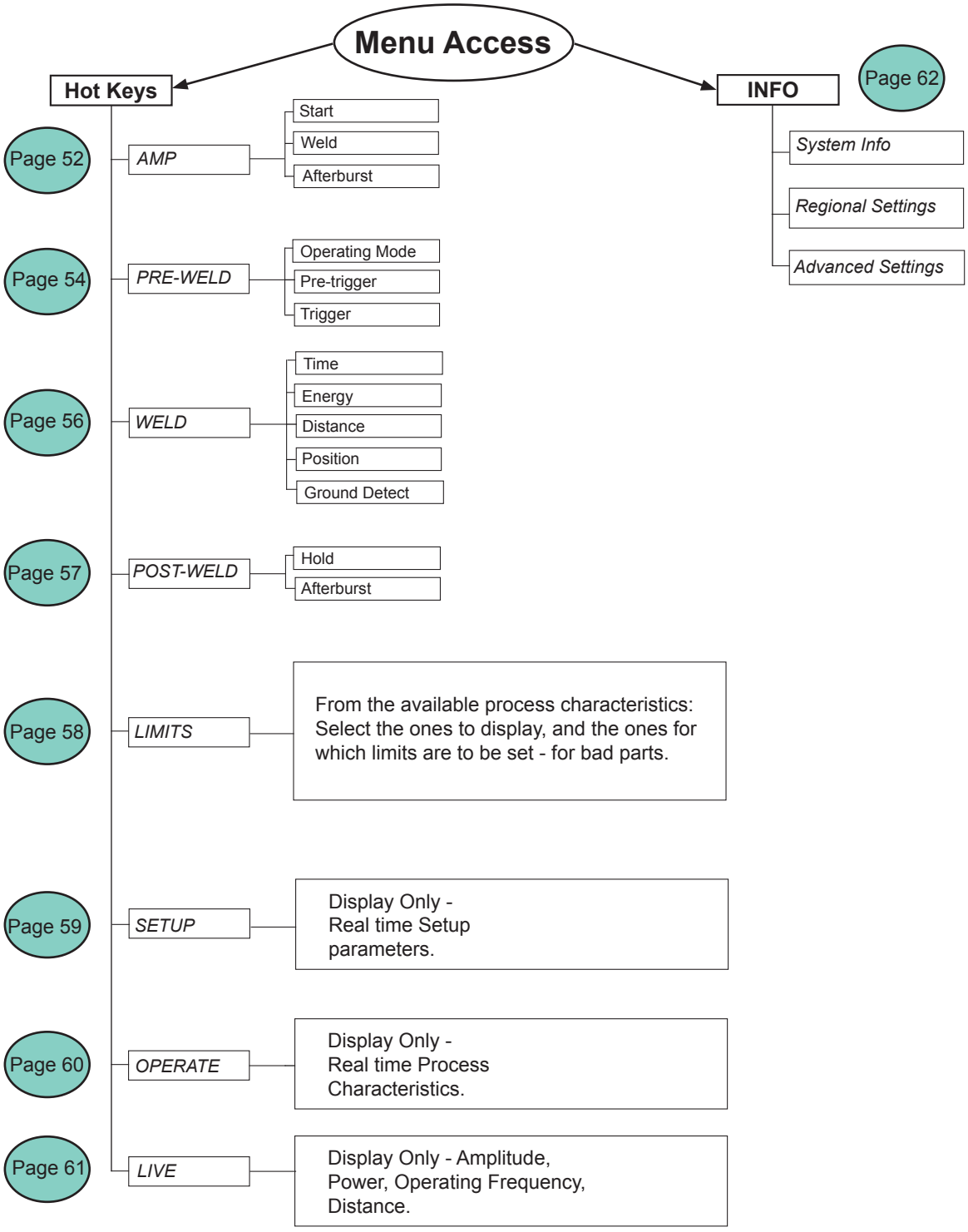

Figure 5-3 i220 Integrated Press Menu Overview

Continued

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NOTE

For all menus - When a button is pressed to access the menu, the last parameter accessed will be selected and ready to change if applicable.

Example: If the PRE WELD button is pressed, and the Trigger Distance value was the setting last accessed in that menu, then Trigger Distance is selected and ready to change.

NOTE

On screen Prompts - Watch for and follow on screen prompts where they appear.

Example: In Figure 5-4 below the prompts are:
PRESS ENTER TO ACCEPT, or PRESS CANCEL TO ABORT

AMP

The menu in Figure 5-4 is the default display showing WELD with its amplitude value highlighted, and ready to be changed. This is true for either operating MODE: - Automated Press or Manual Press.

This is the only available menu IF:

- Trigger is either Momentary or Maintained,
- Pre-trigger is disabled, and
- Postweld characteristics are disabled.

If AFTERBURST is enabled in the POST WELD menu, then the AFTERBURST soft key is also displayed as shown in Figure 5-5 to the right. The parameter value last accessed will be highlighted and ready to change.

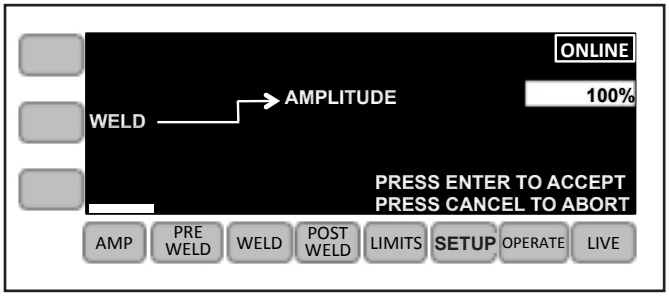

Figure 5-4 Setting Weld Amplitude

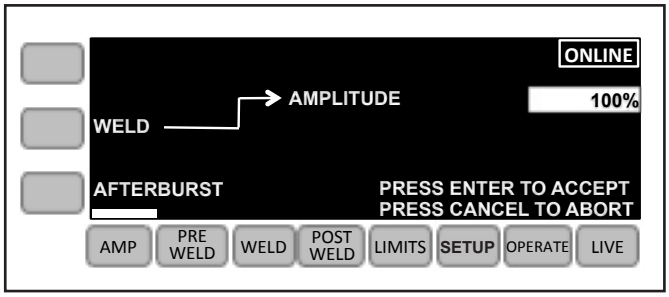

Figure 5-5 Setting Weld Amplitude with Afterburst Enabled

Continued

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If PRE-TRIGGER is enabled in the PRE-WELD menu, then PRE-TRIGGER amplitude is available. See Figure 5-9 on the next page.

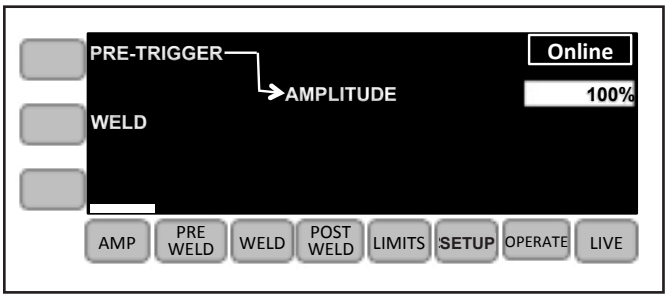

Figure 5-6 Setting Weld Amplitude, Pre-Trigger Available

Press the AMP soft key when:

- PRE-TRIGGER is enabled for START OF CYCLE, and
- TRIGGER selection is POWER.

Then the display shown in Figure 5-7 to the right will be seen.

This menu has START as the top soft key. The value last accessed is highlighted and ready to be changed. In the example shown in Figure 5-7, that is WELD > AMPLITUDE.

For more information about Trigger by Power, refer to our ***Application Note 506*** on the Dukane website at: ***http://www.dukane.com/us/DL_ApplData.asp***

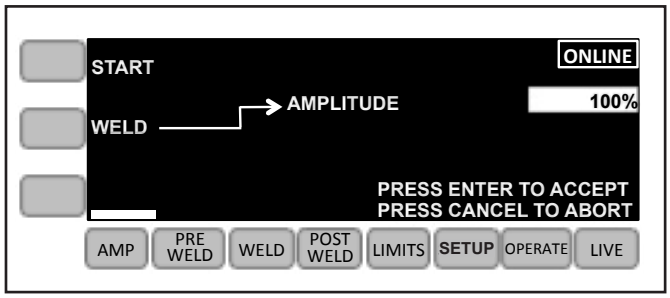

Figure 5-7 Setting Weld Amplitude

If AFTERBURST is enabled in the POST WELD menu, then the AFTERBURST soft key is also displayed as shown in Figure 5-8 to the right. The parameter value last accessed will be highlighted and will be ready to change.

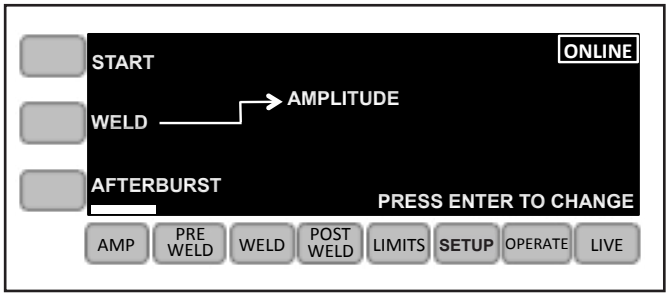

Figure 5-8 Setting Weld Amplitude with Afterburst Enabled

NOTE

Amplitude Range = 20-100%

PRE-WELD

The PRE WELD menu is shown in Figure 5-9. The selected mode is highlighted (MANUAL PRESS). To change to a different mode, move arrow to desired mode, and press ENTER.

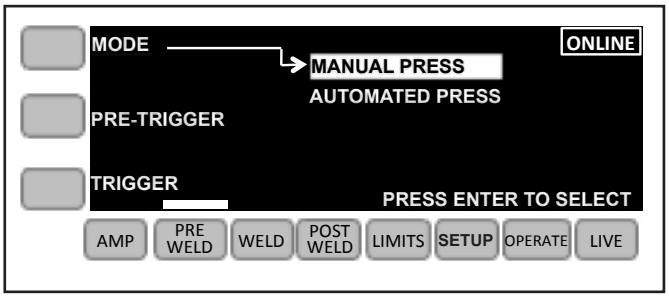

Figure 5-9 Pre Weld Menu, Mode is Manual Press

The PRE WELD menu shown in Figure 5-10 shows the PRE-TRIGGER menu.

The two choices are DISABLED and START OF CYCLE.

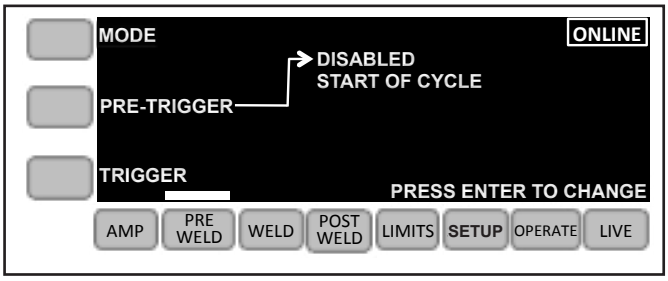

Figure 5-10 Pre Weld Menu, Pre-Trigger Menu

The PRE WELD menu shown in Figure 5-11 shows the PRE-TRIGGER menu with START OF CYCLE selected as the pre-trigger TYPE.

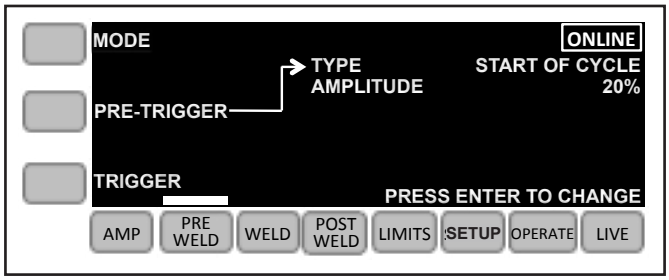

Figure 5-11 Pre Weld Menu, Pre-Trigger Menu, Start of Cycle Selected as Type

The PRE WELD menu shown in Figure 5-12 shows the PRE-TRIGGER menu with START OF CYCLE selected as the pre-trigger TYPE. In addition, pre-trigger amplitude can be adjusted. In the example shown in the figure, 20% can be raised by pressing the + (plus) key. (Since amplitude range is 20% -100% this value can not be lower than 20%.) and lowered by pressing the - (minus) key.

Once the amplitude value has been decided, press ENTER to accept it, or press CANCEL to abort and return to the previous amplitude value.

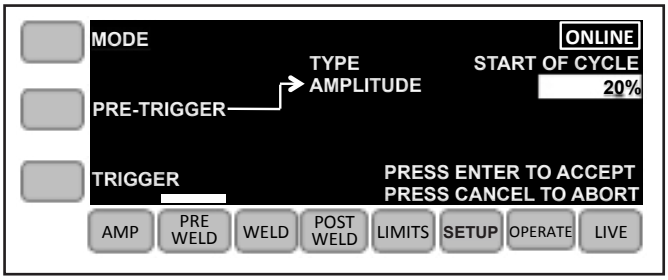

Figure 5-12 Pre Weld Menu, Pre-Trigger Menu, Amplitude Adjustment

Continued

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The PRE-WELD menu with the TRIGGER menu selected shows three types of trigger from which to select: MAINTAINED, MOMENTARY, and POWER.

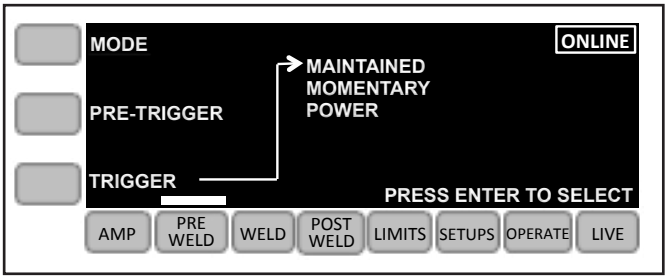

Figure 5-13 Pre Weld Menu, Trigger Menu

The TRIGGER menu with MAINTAINED trigger method selected is shown in Figure 5-14. Select MAX TIME and enter a value (seconds) to set the maximum time from start of cycle to trigger activation. If this time is exceeded a Fault occurs and the cycle is terminated.

If MOMENTARY is selected as trigger type, a value for MAX TIME is entered as well.

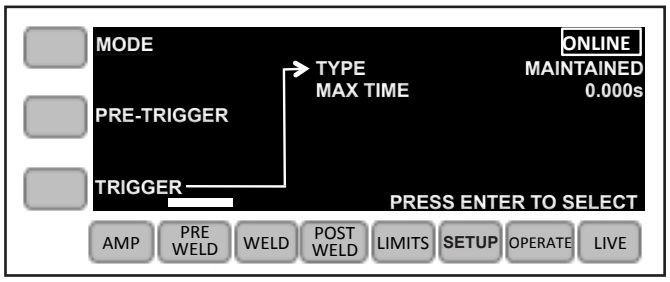

Figure 5-14 Pre Weld Menu, Maintained Trigger Selected

The menu display seen in Figure 5-15 at the right shows that the TRIGGER type selected is POWER.

With POWER as trigger type, AMPLITUDE, POWER (Watts), and MAX TIME need to be entered.

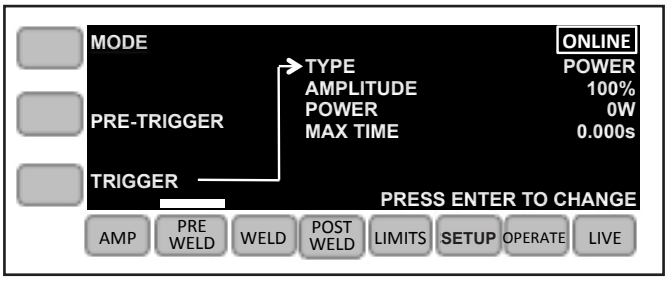

Figure 5-15 Pre Weld Menu, Trigger Selected is Power

WELD

The menu shown in Figure 5-16 at the right appears with three choices for weld parameter.

In this case, distance is not supported by the press.

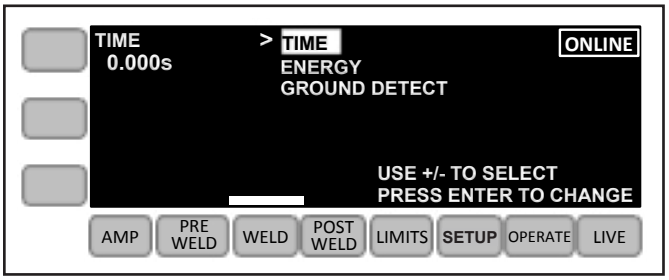

Figure 5-16 Weld Menu, Mode: Manual/Automated Press, Distance not Supported

ENERGY has been selected, and a value for energy will be entered.

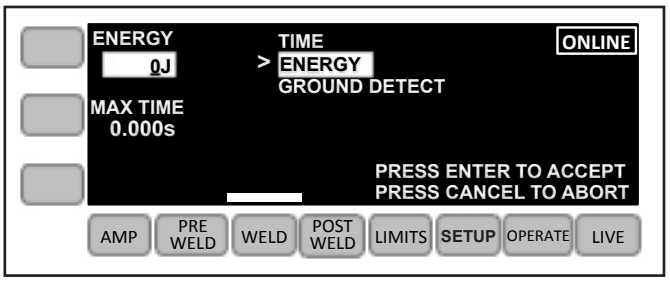

Figure 5-17 Weld Menu, Mode: Manual/Automated Press, Energy Selection

The menu shown in Figure 5-18 at the right appears for either operating mode, and when DISTANCE is supported by the press.

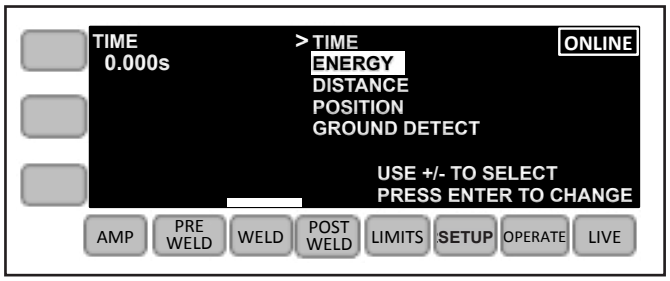

Figure 5-18 Weld Menu, Mode: Manual/Automated Press, Distance is Supported

The menu shown in Figure 5-19 at the right appears when the ENERGY value is being entered.

(Range in Joules: 0-99999.9)

MAX TIME, a secondary parameter, must be programmed in its range of 0-30.00 seconds. This is the maximum length of the weld and when reached will stop the weld portion of the cycle. This does not result in a fault.

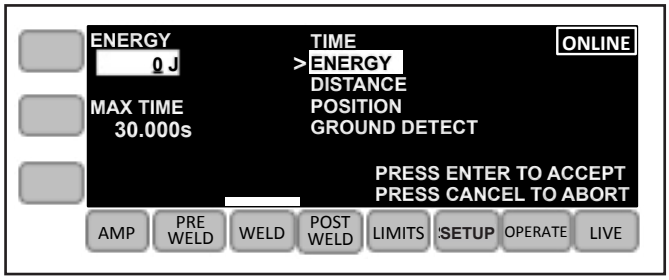

Figure 5-19 Weld Menu, Mode: Manual/Automated Press, Energy Entry

NOTE

Weld Time: Range is 0-30 seconds.

POST-WELD

The POST WELD menu seen in Figure 5-20, shows the display with the mode set either to MANUAL PRESS or AUTOMATED PRESS.

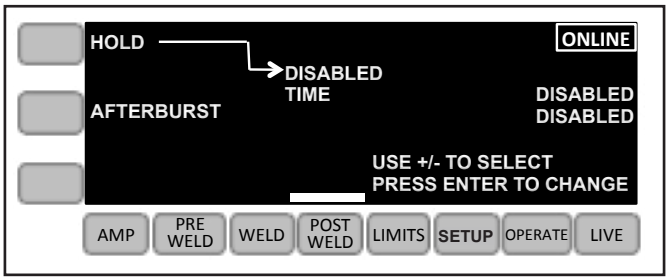

Figure 5-20 Post Weld Menu

When TIME has been selected as the HOLD control method, the menu appears as shown in Figure 5-21 to the right.

Note that TIME is highlighted, ready to be changed.

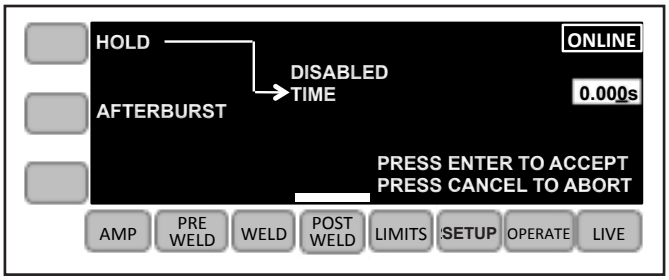

Figure 5-21 Post Weld Menu, Time Setting

The menu in Figure 5-22 at the right shows that AFTERBURST is disabled.

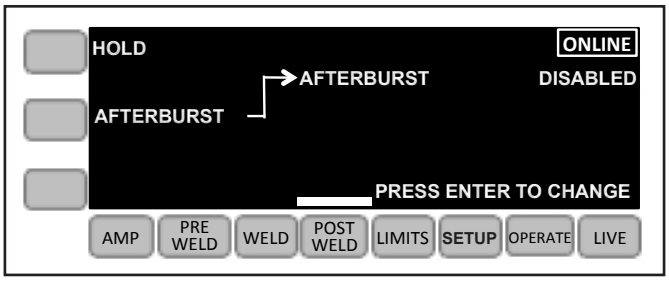

Figure 5-22 Post Weld Menu, Afterburst Disabled

The menu to the right in Figure 5-23 is displayed when AFTERBURST is enabled.

Values for afterburst amplitude, afterburst delay and afterburst duration should be entered.

Figure 5-23 shows the entry box for afterbust amplitude is highlighted.

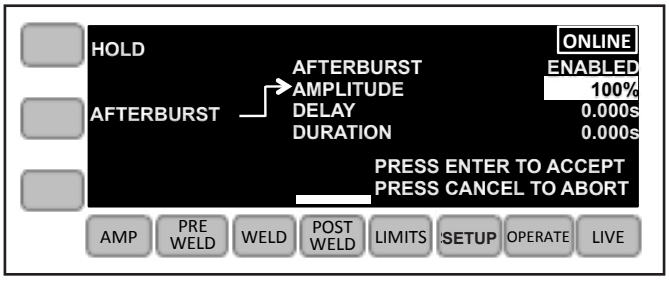

Figure 5-23 Post Weld Menu, Afterburst Enabled

LIMITS

The LIMITS menu seen in Figure 5-24, illustrates the display that is shown when either in MANUAL PRESS or AUTOMATED PRESS mode.

In the example shown to the right, the DISPLAY soft key was pressed to select ENABLED. Press the key again to select DISABLED.

When the BAD soft key is pressed (in the menu shown in Figure 5-24 above), the display will appear as it does in Figure 5-25 to the right.

Selecting ENABLED will change the menu to what is shown in Figure 5-26.

The LIMITS menu shown in Figure 5-26 allows setting upper and lower limits. Use the soft keys to highlight the parameter value to be changed. Press DONE to return to the main LIMITS menu.

The example menu shown in Figure 5-27 appears when BAD PART LIMITS are enabled for TIME.

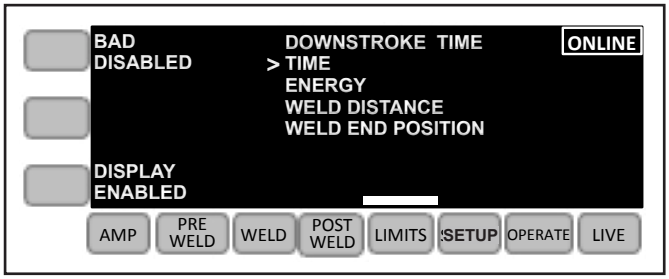

Figure 5-24 Limits Menu

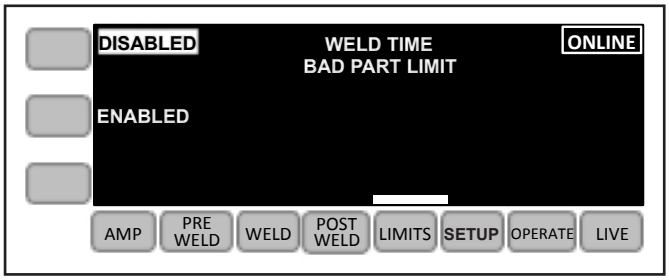

Figure 5-25 Limits Menu, Bad Soft Key Pressed

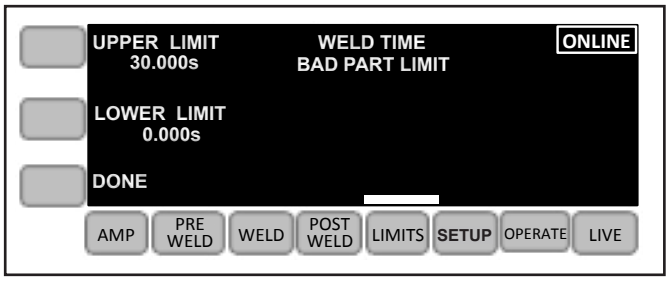

Figure 5-26 Limits Menu, Setting Upper and Lower Limits

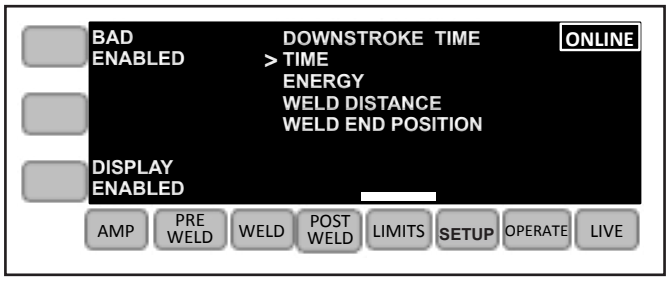

Figure 5-27 Limits Menu, Bad Parts Limits Enabled for Time

NOTE

The Limits menu items, Weld Distance and Weld Position would not appear in units that do not support distance.

SETUP

SETUP provides a monitoring function only.

Press the SETUP menu soft key to review characteristics of the current press setup.

Figure 5-28 displays a typical setup.

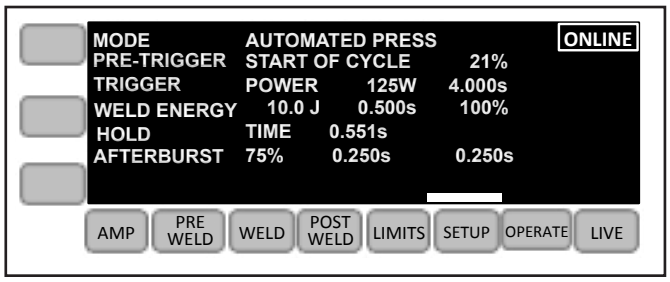

Figure 5-28 Setup, Typical Display

OPERATE

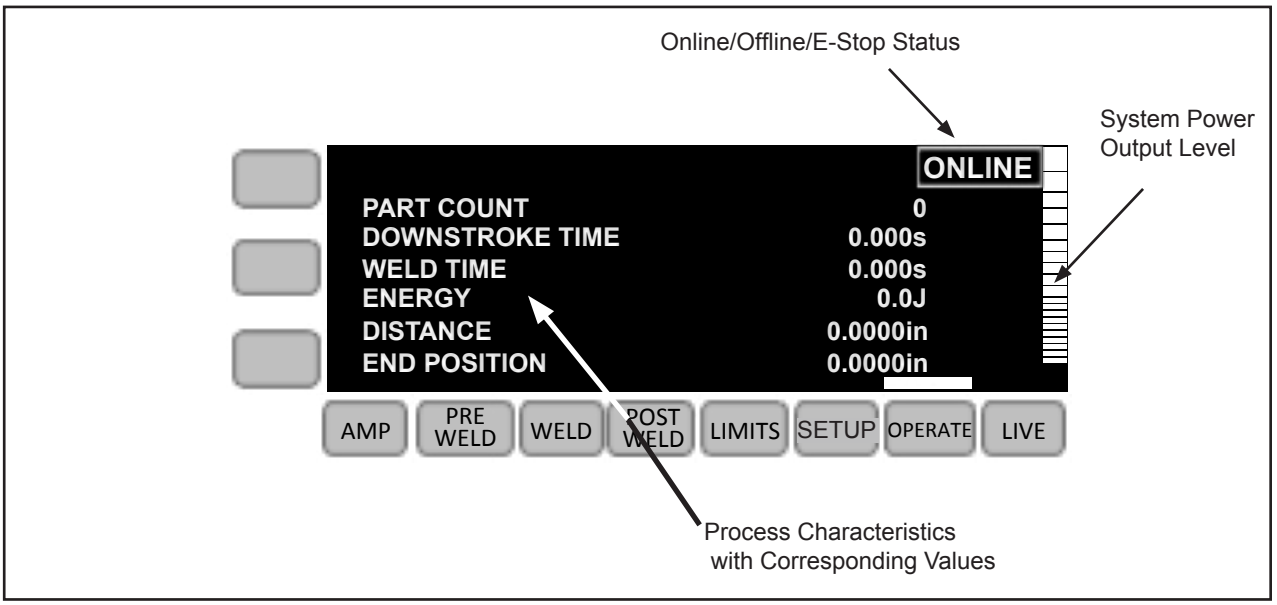

Figure 5-29 Operate Screen

When the press is powered up, there is an initial screen that shows system information. That is followed by the Operate screen as shown in Figure 5-29 above.

This is a display only screen. The values displayed are from the last weld cycle. The operator can access this screen by pressing the OPERATE hot key.

The process characteristics shown in Figure 5-48 above are the ones where part limits have been enabled, or are those that have been selected to display.

As an example, here is a list of all possible characteristics that a distance press could have. (If distance is not supported, then the distance related characteristics would not be available.)

Weld Time
Peak Power
Energy
Weld Distance
Weld End Position

LIVE

When the LIVE hot key is pressed, the display as shown in Figure 5-30 to the right is seen.

This is also called the Live Data screen.

The screen shows the current value of the parameters shown. These values are shown regardless of whether the press is in cycle or not.

If distance is not supported, it would not be displayed.

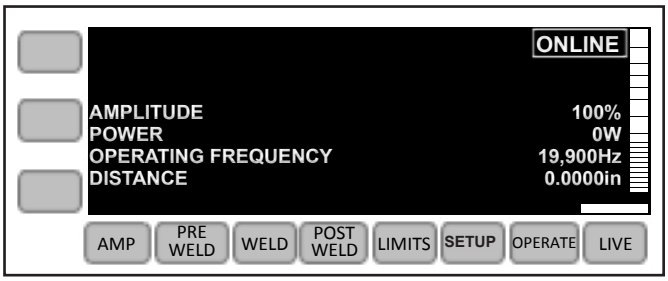

Figure 5-30 Live Data Screen

IN CYCLE

When the LIVE hot key has been pressed, and the press is in cycle, the screen shown in Figure 5-31 is displayed.

The screen shows the current value of the parameters shown.

If DISTANCE is not supported, it would not be displayed.

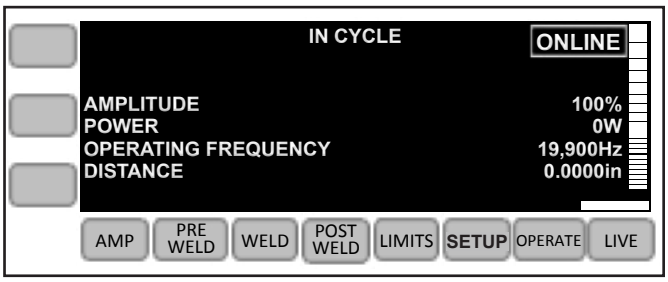

Figure 5-31 In Cycle Screen

TEST

When the TEST soft key has been pressed, and the press is online, the screen shown in Figure 5-32 is displayed.

The screen shows the current value of the parameters shown.

If DISTANCE is not supported, it would not be displayed.

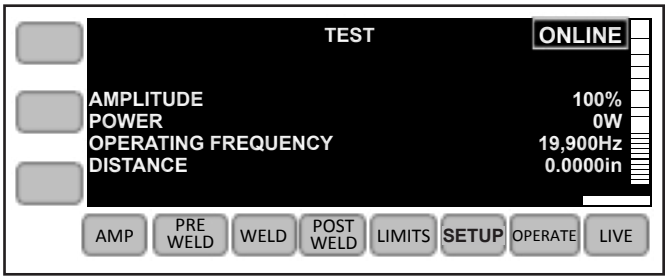

Figure 5-32 Test Screen

Using the INFO Menus

Press the INFO key, and the menu shown to the right in Figure 5-33 appears.

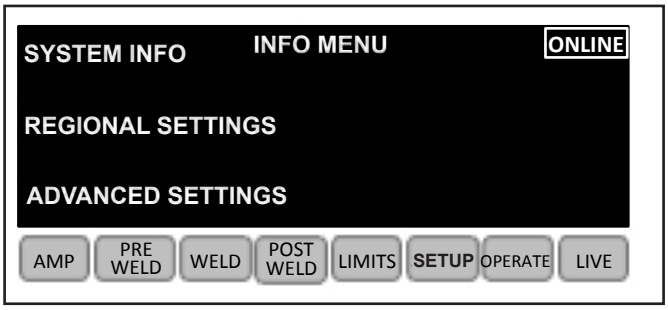

Figure 5-33 Info Menu Display I

SYSTEM INFO - To display information about the press hardware, press the SYSTEM INFO button. Figure 5-34 shows an example display of that information.

Figure 5-34 System Info

REGIONAL SETTINGS - Pressing the REGIONAL SETTINGS button allows setup for LANGUAGE (Figure 5-35), and it allows setup for UNITS.

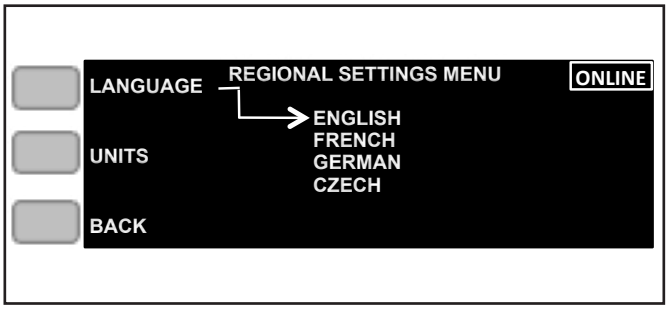

Figure 5-35 Regional Settings, Language Menu

UNITS - To set up preference for units press the INFO key, go to the REGIONAL SETTINGS MENU, and then to the UNITS key. See Figure 5-36.

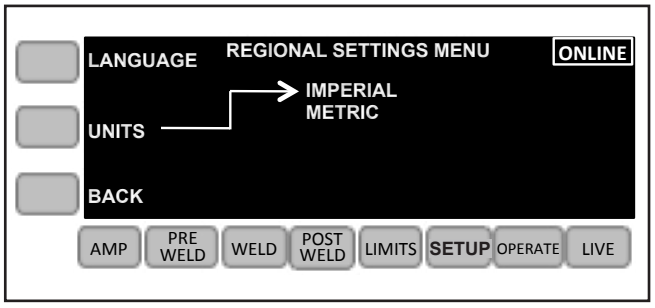

Figure 5-36 Regional Settings, Units Menu

Continued

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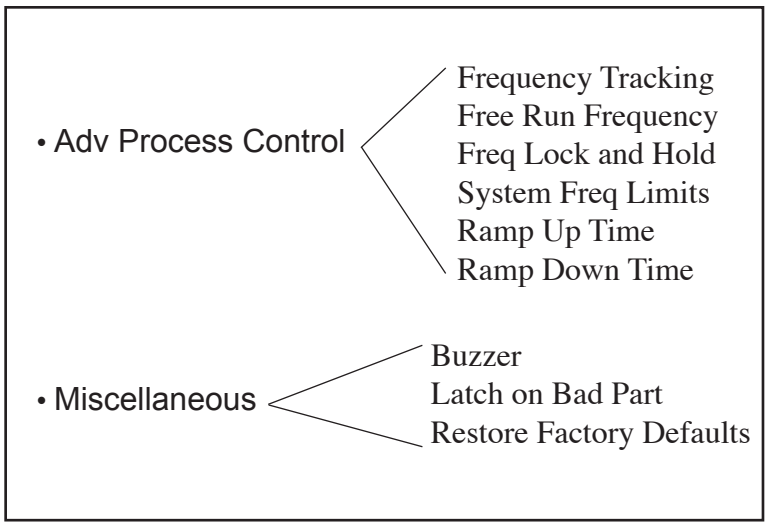
ADVANCED SETTINGS - This part of the INFO menu gives access to the two sub-menus, Adv Process Control, and Miscellaneous and their menu items as shown below in Figure 5-37.



WARNING

Modifying Advanced Settings may damage the unit or ultrasonic stack.

Figure 5-37 Advanced Settings Menu Overview

Pressing the ADVANCED SETTINGS button brings up the ADV PROCESS CONTROL sub-menu first. See Figure 5-38.

Figure 5-38 Advanced Process Control Menu

Continued

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If the RESTORE DEFAULTS key is pressed while the Adv Process Control menu is displayed, the screen shown at right (Figure 5-39) is seen.

Figure 5-39 Restore Defaults, Adv Process Controls

If the defaults are restored, the display with the confirmation message shown in Figure 5-40 at right is shown for 5 seconds.

After that, the display will once again appear as it does in Figure 5-38.

Figure 5-40 Restore Defaults, Confirmed, Advanced Process Control

Continued

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Adv Process Control Sub-menu Items

The six sub-menu items and their corresponding displays are shown (See Figure 5-41.) and described below and on the next page:

1) Frequency Tracking

When enabled, at the end of each cycle the operating frequency is applied to the Free Running Frequency setting. It's based on a 16 point average. Therefore, after 16 cycles, the actual operating frequency will be the Free Running Frequency setting. If the press has not been cycled for a minimum of 5 minutes, the press will request that the stack be scanned in order to verify the optimum Free Running Frequency setting. For more information about Frequency Tracking, refer to our ***Application Note 513*** on the Dukane website at: ***http://www.dukane.com/us/DL_ApplData.asp***

2) Free Run Frequency

Free run is the frequency at which the press drives the ultrasound output pulses until a valid feedback signal is detected. Typically this value should be below the operating frequency of the stack

Use the Scan feature to determine the optimum Free Run Frequency.

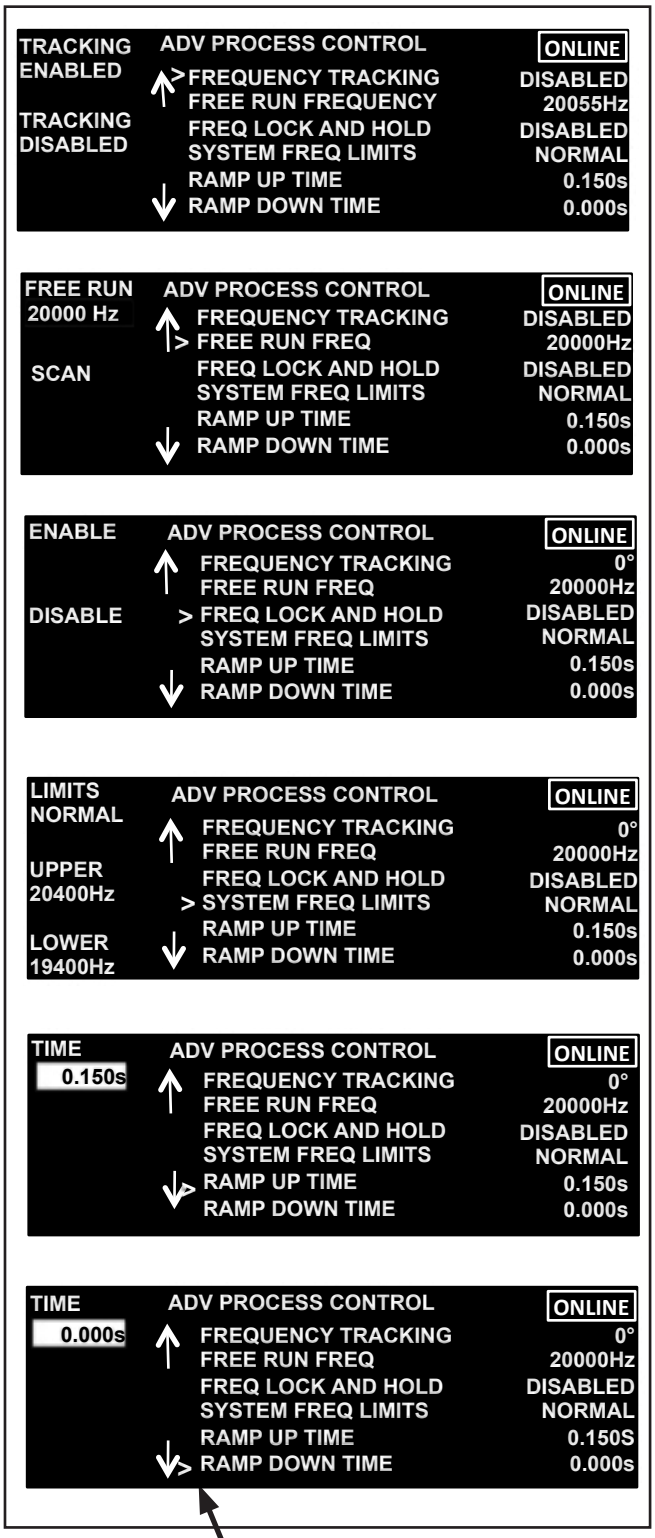

Figure 5-41 Advanced Process Control Sub-menu Items

Moving to the Next Sub-menu

When > is next to RAMP DOWN TIME, and the down key (minus) is pressed, the next sub-menu for Miscellaneous replaces the Adv Process Control sub-menu.

Continued

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Scan Stack

To scan the stack: Scroll to Free Run Frequency in the displayed list and select the Scan Stack soft key. Follow the displayed instructions.
See Figure 5-42 to the right.

When scan is complete, the scan results appear as in the example shown in Figure 5-43.

For more detail on the Scan Stack feature please refer to our website to download:

Application Note 512 at http://www.dukane.com/us/DL_ApplData.asp

3) Freq Lock and Hold

When frequency lock and hold is disabled the frequency of the stack is tracked by changing the frequency of the ultrasound driving pulses to match the feedback signal frequency.
When enabled the frequency of the feedback is tracked until lock is achieved then it is ignored and the ultrasound output remains at a fixed frequency until the end of the weld.

Enable or Disable this feature.

4) System Freq Limits

Limits can be: Wide, Normal, Narrow, or Manual.

Wide - In wide mode the upper and lower frequency limits are set to the maximum and minimum allowed frequencies.

Normal - In Normal mode the upper and lower frequency limits equal the free run frequency plus or minus 500Hz.

Narrow - In Narrow mode the upper and lower frequency limits equal the free run frequency plus or minus 200Hz.

Normal, Narrow, or Wide - *Enter Upper and Lower Limits within prescribed frequency limitations.*

Manual - In Manual mode the user sets the upper and lower frequency limits. To be valid, the settings must be within the maximum and minimum values allowed and at least 25Hz greater than the "upper" free run frequency and 25Hz less than "lower" free run frequency.

Manual - *Enter Upper and Lower Limits*

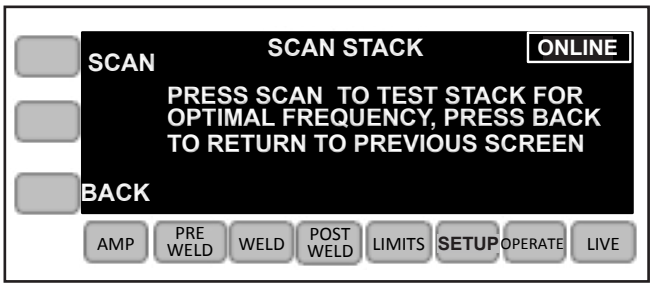

Figure 5-42 Scan Stack - 1

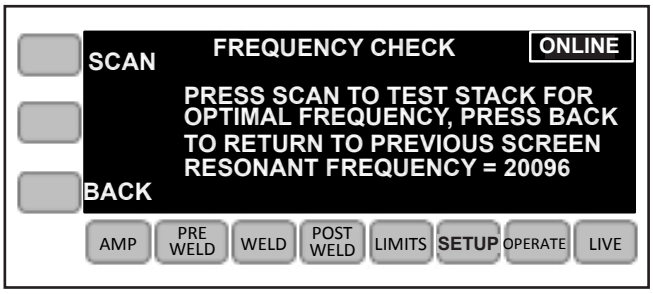

Figure 5-43 Scan Stack - 2

NOTE

Why System Frequency Limits Modes Might be Chosen

Wide - This mode is primarily used for testing "bare" transducers (no booster or horn attached).
Normal - This mode is the one most often used covering a wide variety of horns.
Narrow - This mode is used when the acoustic stack has known unwanted frequencies that are close to the main operating frequency.
Manual - This mode allows for a frequency range to include only frequencies that are wanted, and excluding unwanted frequencies.

Continued

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5) **Ramp Up Time**

Ramp up time increases the amplitude linearly in the programmed time period at the start of the weld, from zero to the programmed amplitude level. This brings the stack up to operating amplitude smoothly preventing shock stress.

Factory setting is 0.150 seconds.

Range is 0.000 to 1.250 seconds.

6) **Ramp Down Time**

Ramp down time decreases the amplitude linearly to zero in the programmed time period following the end of the weld, when ultrasound is shutting off.

Factory setting is 0.000 seconds.

Range is 0.000 to 0.250 seconds.

NOTE

Larger, high amplitude horns may require a longer ramp up time to properly start.

NOTE

Ramp Down Time

Ramp Down Time extends the service life of complex acoustic stacks by minimizing stresses encountered during the process of shutting off the ultrasound. It is especially recommended for very large horns, or when the ultrasound is shut off in air.

Continued

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Miscellaneous Sub-menu Items

The three sub-menu items and their corresponding displays are shown to the right in Figure 5-44.

1) **Buzzer**

Set the audible buzzer to sound:
At Top of Stroke - Enable or Disable, or
At Trigger - Enable or Disable

2) **Latch on Bad Part**

Enable or Disable this feature.
When Latch on Bad Part is enabled, the cycle stops when a bad part is detected. The operator must deal with this before a new weld cycle can begin.

3) **Restore Factory Defaults**

Press the RESTORE soft key to erase ALL setups and factory defaults.

An intermediate display prompts confirmation with a YES or NO.

If YES is chosen, then another message is displayed as shown to the right.

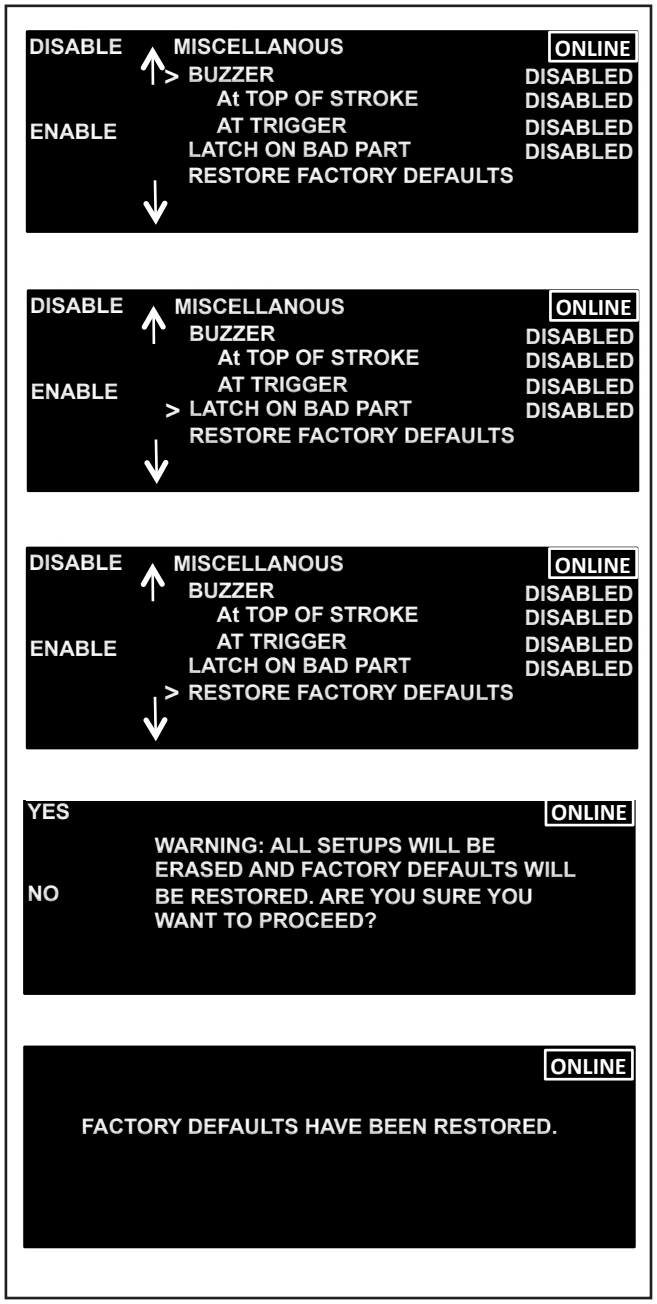

Figure 5-44 Miscellaneous Sub-menu Items

ALARMS

Terminology: Alarm refers to any fault, or error the press might produce.

An alarm condition may occur. Figure 5-45 shows the format for a typical alarm display.

The list below gives general reference information for each alarm condition.

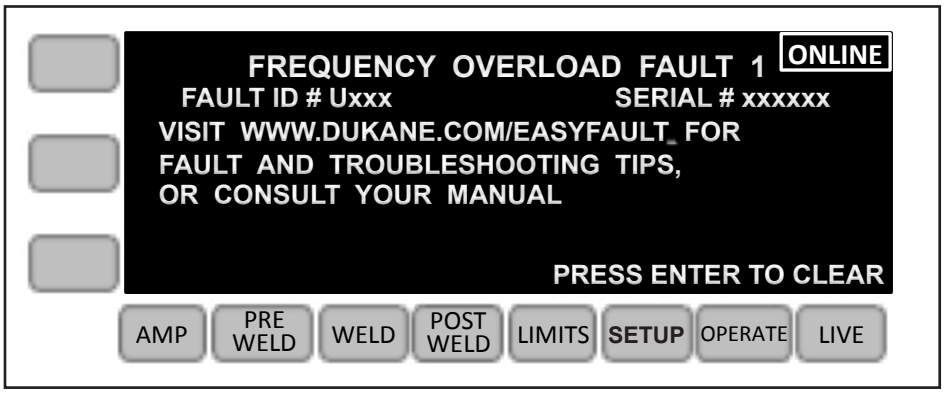

Figure 5-45 Alarm Message Screen

FAULTS:
- U100 Configuration Fault (Default Setup Corrupted, Model Number Incorrect, Serial Number Incorrect, Feedback Scaling Incorrect, etc)
- U103 Hardware Fault (Hardware Changed, Remote Amp Card removed?)
- U104 Frequency Overload Fault 1 (Lock Fail)
- U105 Frequency Overload Fault 2 (Lock Lost)
- U106 Peak Overload Fault
- U107 NEG Peak Overload Fault
- U108 Average Overload Fault
- U109 Bad Current Loop Fault
- U110 Power not OK Fault
- U111 Over Temperature Fault
- U112 Frequency Overload Fault 3 (Limit Exceeded)

INITIATE ERRORS:
- U300 Operate Switch 1 Pressed before Cycle Start
- U301 Operate Switch 2 Pressed before Cycle Start
- U302 Auto In switch closed at End of Cycle
- U304 Trigger switch closed before Cycle Start
- U305 Pre-trigger switch closed before Cycle Start
- U306 End Weld input enabled before Cycle Start
- U307 Ground Detect input enabled before Cycle Start
- U308 Generator or Press Not Ready

PROCESS ERRORS:
- U400 Weld Limits enabled for continuous Operation
- U401 Weld Time set to Zero
- U402 Weld Power set to Zero
- U403 Weld Energy set to Zero
- U404 Weld Distance set to Zero
- U405 Weld Position set to Zero
- U406 Max Trigger Time set to Zero
- U407 Forced Shutdown Fault
- U408 Trig Lost Early Fault
- U409 Trig Lost Weld Fault
- U410 Pre-trigger Overtravel Fault
- U412 Max Pre-trigger Time exceeded
- U413 Max Trigger Time exceeded
- U414 Max Trigger Delay Time exceeded

Table 5-I Alarm Messages

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SECTION 6

Options

Overview. 73
Power Inlet Options 74
Distance Encoder 76

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Overview

This section of the User's Manual provides a general overview of some options/upgrades for the i220 Integrated Press, all of which are subject to availability.

These options/upgrades are:

- Power Inlet
- Distance Encoder

Additional Options

Dukane can provide high-quality automation equipment for efficient handling and assembly of parts. This equipment is tailored specifically to your needs. Some of the available options include pick and place automation, rotary tables, in-line indexing, conveyors, and walking beams.

Dukane can also provide standard and custom sound enclosures. The additional options are not covered in this manual due to their specialized applications.

Contact your local Dukane representative for more specific information, or visit the Dukane website:

www.dukane.com/us/PCU_custom.htm

Power Inlet Options

120V Systems for North America and Japan

120V systems for North America and Japan have a fixed (non-detachable) power cord.

This option is available on presses with power ratings of 1200 watts or less and with operating frequencies of 20kHz, 30kHz, or 40kHz.

See Table 11-II in ***Section 11, Specifications***.

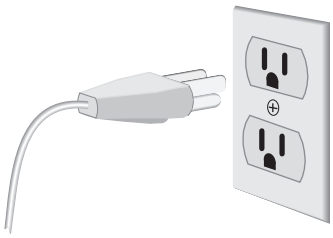
CAUTION

If you have a two-prong electrical receptacle, we strongly recommend that you replace it with a properly grounded three-prong type. Have a qualified electrician replace it following the National Electric Code and any local codes and ordinances that apply.

Electrical Safety

120V Power Ground

For safety, the power cords used on all Dukane products have a three-prong, grounding-type plug.



Approved 2 pole, 3 wire grounding receptacle HUBBELL No. 5262 or equivalent to NEMA 5–15R or 5–20R

Figure 6-1 Example of 120 Volt, Grounded, 3-Prong Receptacle

CAUTION

If there is any question about the grounding of your receptacle, have it checked by a qualified electrician. Do not cut off the power cord grounding prong, or alter the plug in any way. If an extension cord is needed, use a three-wire cord that is in good condition. The cord should have an adequate power rating to do the job safely. It must be plugged into a grounded receptacle. Do not use a two-wire extension cord with this product.

AC Power Inlet Panel

The optional AC power inlet panel is described here.

AC Power Cord

An AC power cord is appropriately rated and can be permanently mounted at Ⓐ in Figure 6-2 to the power inlet panel.

Power Switch/Circuit Breaker

The power switch/circuit breaker (Ⓑ in Figure 6-2) has a rocker type actuator switch that will activate or deactivate the AC power to the system. The power ON position is marked with the internationally recognized I symbol, the power OFF position is marked with the 0 symbol. This power switch also integrates an appropriately sized over-current protection circuit breaker function in the press.

If an over-current condition trips the circuit breaker, it will automatically switch to the OFF position. If the overload current that caused the circuit breaker to trip is due to a transient condition, the circuit breaker can be reset by switching the actuator back to the ON position. If when resetting the circuit breaker after it has tripped, it immediately trips again, there is likely an internal system malfunction that will require service.

Do not repeatedly try to reset the circuit breaker. If it trips, this will only cause more damage to the press

Chassis Ground Stud

The chassis ground stud is used to attach a protective earth ground to the generator. This will aid in the suppression of electrical interference or radio frequency interference (RFI) that is common in an industrial environment. The chassis ground stud is Ⓒ in Figure 6-2. Proper system grounding is discussed on Page 9.

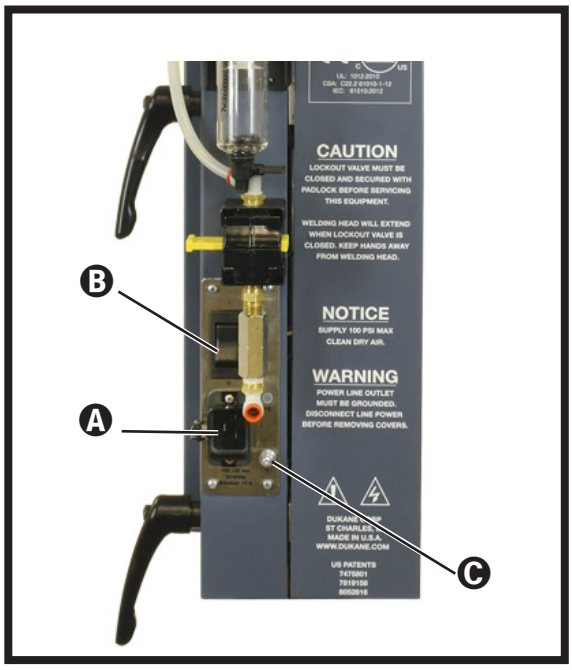


Figure 6-2 120VAC Power Inlet Panel

Distance Encoder

Purpose

To install and calibrate the distance encoder in order to accurately measure the distance of thruster travel.

Requirements

Parts

Kit (P/N 438-1026) consisting of the following:

- Encoder P/N 625-37,
- Encoder head cable cover bracket, and
- Mounting screws and hardware.

Tools

- Phillips-head screwdriver
- Feeler gauge set (0-.050 inches) or metric equivalent
- 6 inch ruler or metric equivalent

Installation Instructions

Dismantling

1. Facing the front of the press, remove the panel from the right side of the press. (See Figure 6-3.)

Reassembly

1. Attach the encoder scale to the mounting screw holes in the right side of the thruster with pan-head screws. Do not tighten.

2. Route the encoder cable along the right side of the encoder, up through the slot in the air cylinder plate and along the counterbalance air cylinder.

3. Connect the encoder cable to the internal receptacle J5 near the top of the press.

4. Mount the cable cover bracket to the press casting, trapping, but not pinching, the encoder cable so that it doesn't rub against the moving encoder body.

5. Gently slide the encoder head down until the mounting screw holes in the press support base appear in the head's mounting slots.

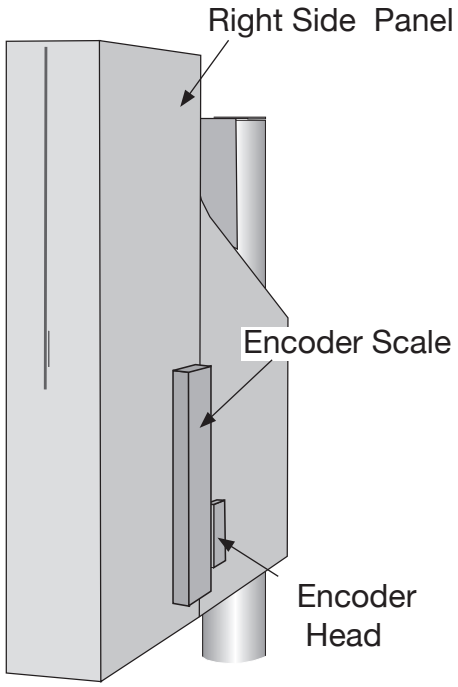


Figure 6-3 Distance Encoder Mounting

Continued

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Reassembly

6. Center the screw holes in the mounting slots. Secure the encoder head with the two pan-screws but do not tighten them yet.

Alignment

The purpose of this alignment is to set the internal reference mark for the encoder. This reference mark resets the distance register in the press after each thruster cycle and ensures repeatable distance measurements from cycle to cycle.

1. Check the position of the encoder scale's mounting hole slots using the 6" ruler. Measure the distance from the center of the screw to the edge of the slot in both directions. When the screws are centered horizontally, carefully tighten the screws.

2. Measure a vertical distance of 1.375 inches (34.92 mm) up from the bottom edge of the encoder scale, as shown in Figure 6-4.

3. Adjust the bottom edge of the encoder head to align to this distance and tighten the screws on the encoder head.

4. Push in the ABORT button (on the press base).

   Turn on the press, and then press the LIVE hot key on the front panel.

5. Set the air pressure to the desired level.

6. Perform the following procedure to test the encoder for the proper setting:

   • Pull out the ABORT button (on the press base). Allow the thruster to return to top of stroke.

   • If the encoder position reads -0.06" to 0.30", then the encoder is set correctly.

   • Secure the two screws. Proceed to Step 7.

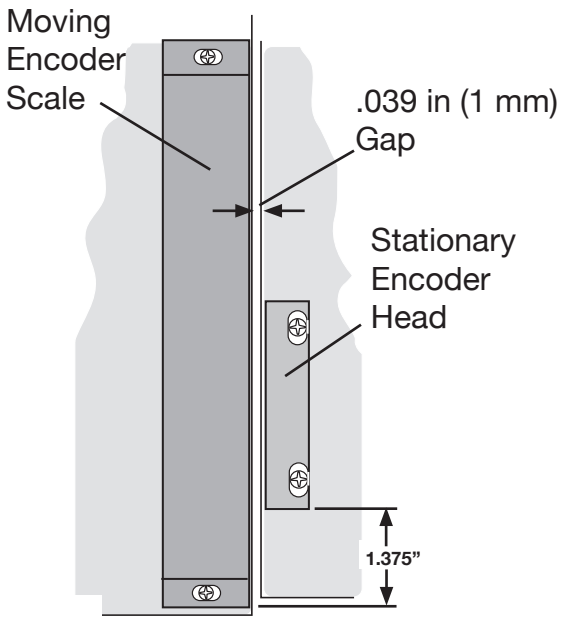

Figure 6-4 Distance Encoder Alignment

WARNING

Keep hands and clothing away from an activated press.

Continued

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Alignment

7. Set the gap between the encoder scale and head, using the feeler gauge .039 inch (1 mm) blade.

8. Measure the gap at the top and bottom of the stroke. Allowable tolerance, as specified by the encoder manufacturer, is ±.005. This is a range of from .034 to .044 inches (.864 to 1.12 mm).

9. Tighten all the screws and check the measurements again.

10. Replace the press/thruster right side panel.

SECTION 7

Acoustic Stack/Fixture Setup

Overview 81
Stack Description 82
Changing Stack Components 83
Stack Removal 83
Stack Disassembly 84
Removing a Detachable Tip 84
Stack Assembly and Torque Values 85
Installing a Detachable Tip 86
Installing the Stack 86
Fixture Installation 87
Fixture Alignment 87
Fixture Leveling 88

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Overview

A Dukane ***iQ*** i220 integrated press can be used to assemble an unlimited variety of parts for every conceivable market segment, including automotive, medical, appliance, consumer, packaging and toy industries. Various techniques and processes, such as welding, staking, swaging, inserting, and spot welding can be used for the different applications.

This variety is made possible through the interchange of some system components. Of these components, the horn and fixture are usually custom-made for each application, and the booster that is selected for a job depends on the required horn output amplitude. Also, the press/thruster controls are specifically adjusted for each application.

This section provides instructions for setting up these components of the system in a new installation or when changing applications.

Stack Description

The acoustic stack shown in Figure 7-1 consists of three parts:

- Transducer
- Booster
- Horn

The transducer and the booster are normally shipped assembled and installed in the press. The horn and/or the fixture may be shipped separately.

The stack is easily removed from or installed in the press/thruster. This makes it possible to change the horn or booster. It also makes it easier to perform regular inspections and/or maintenance of the stack components.

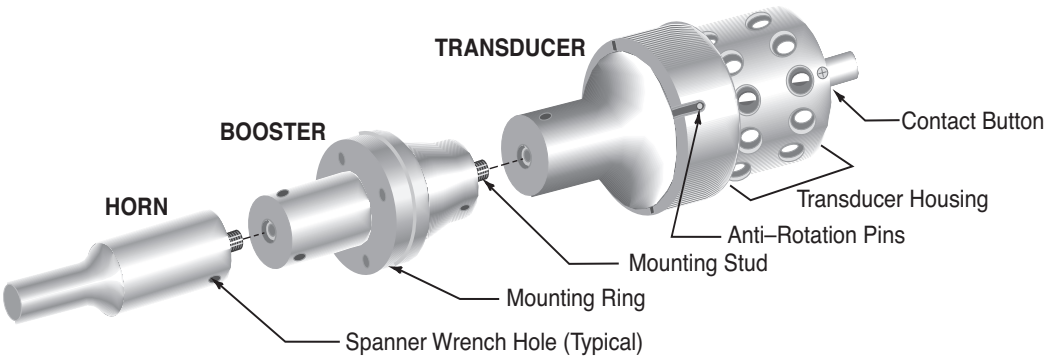

Figure 7-1 Stack Components

Changing Stack Components

Stack Removal

Before removing the stack, perform the following steps:

1. Activate the E-STOP (Abort) switch on the front of the press base.
2. Power down the press.

These two steps are necessary to ensure that no power will be accidently applied while removing the stack.

3. While supporting the stack with one hand, loosen the two or four socket-head screws that secure the stack access door.
4. If the door has two screws, swing it open. If it has four screws, remove it completely.
5. Pull the stack forward and down until the transducer clears the electrical contact. Refer to Figure 7-2.
6. Lift the stack out of the housing.

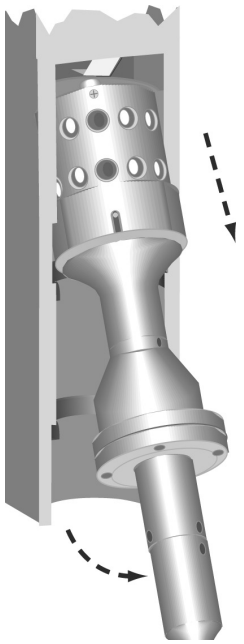

Figure 7-2 Stack Removal

CAUTION

The stack access door on the press/thruster holds the stack components in the stack housing. Hold the stack by the HORN or the exposed part of the BOOSTER when removing or installing the access door. This will prevent the stack from falling out and being damaged.

NOTE

When changing or inspecting any of the stack components, ALWAYS remove the stack from the thruster.

CAUTION

There may be an electrical charge stored in the transducer. To avoid any electrical shock, do not touch the contact button when removing the stack.

Stack Disassembly

To separate the stack component carefully follow the instructions below:

1. Use the two spanner wrenches (wrench A and B) provided with the press. Place wrench A on the component to be removed (Refer to Figure 7-3) and wrench B on the one next to it. Turn wrench A in the direction indicated.

   Once the component is loose, it can be removed by hand.

2. To maintain structural integrity, NEVER hold a transducer by the housing or the booster by the mounting rings while separating components. Doing so will result in damage to the unit.

3. Use only the tools recommended by Dukane. NEVER clamp a horn, booster, or transducer in a vise or use tools such as pliers, visegrips, etc. Doing so will result in scratches and/or gouges, resulting in stress areas on the surface. This condition will affect the stack operation and could lead to failure of each stack component.

Removing a Detachable Tip

If the horn has a detachable tip, do the following:

1. Use a spanner wrench to hold the horn, as shown in Figure 7-4.

2. Turn a properly sized open end wrench to loosen the tip.

NEVER clamp the horn or use a vise to hold it.

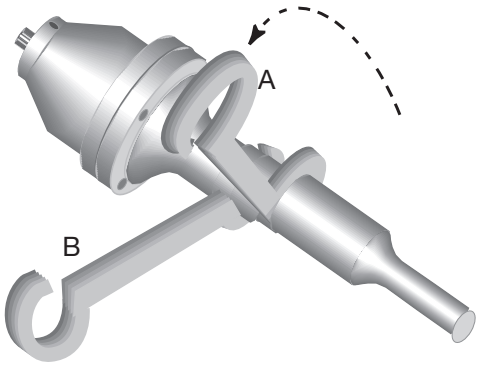

Figure 7-3 Disassembling Components

CAUTION

To avoid possible injury, press down on the spanner wrench with the palm of the hand.

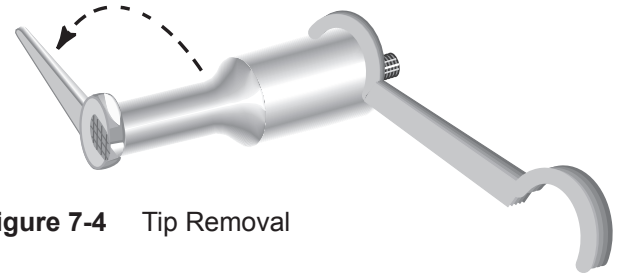

Figure 7-4 Tip Removal

Stack Assembly

Before assembling a stack, inspect all of the components for possible damage — especially the surfaces that are to be joined. Look for non-flat surfaces (concave, convex), stress cracks, chips, or gouges. Any of these irregularities will affect the operation of the stack and could cause further damage. Contact the Dukane Ultrasonics Tooling Department concerning a damaged component.

When the components have been inspected and are found to be free of any damage, continue with the following steps:

1. Inspect the contact surfaces for smoothness and cleanliness. Pitting or a buildup of old grease and dirt on the surface will interfere with the transfer of energy from one component to another.

2. Remove any foreign matter from the threaded stud and the mating hole. Tighten the stud in the stack component that is most distant from the transducer according to the following stud torque values:

Stud Thread Size	Torque		
	inch-lbs	foot-lbs	Nt-meters
1/2 in. x 20	12-18	1 - 1.5	1.4 - 2
3/8 in. x 24	12-18	1 - 1.5	1.4 - 2
M8 x 1.25	12-18	1 - 1.5	1.4 - 2

Table 7-I Stud Torque Values

3. Coat one of the contact surfaces with a thin coat of high-pressure grease. A small packet is supplied with the system. We recommend Dow–Corning #4 (or #111 as an alternate).

4. Thread the components together and tighten (Refer to Table 7-II) by applying torque as follows:

Stack kHz	Torque		
	inch-lbs	foot-lbs	Nt-meters
15	540	45	61
20	420	35	47.5
30	216	18	24.4
40	216	18	24.4

Table 7-II Horn/Booster Torque Values

NOTE

Do not apply any grease or lubricant to the stud.

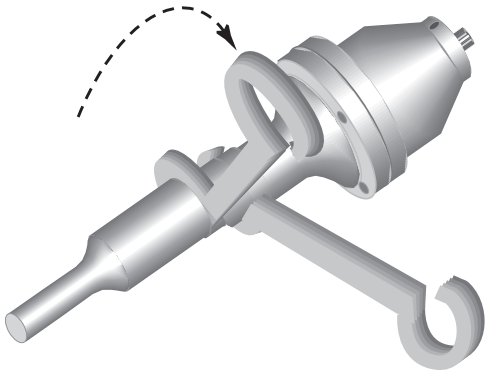

Figure 7-5 Assembling Components

Installing a Detachable Tip

If the horn has a detachable tip, do the following:

1. Inspect the surfaces of the tip and the horn for any stress cracks, chips or gouges.

2. Coat one of the contact surfaces with a thin coat of high-pressure grease or lubricant. We recommend Dow–Corning #4 (or #111 as an alternate).

3. Thread the tip into the horn. To tighten the tip, use the open-end wrench for the tip and a spanner wrench to hold the horn, as shown in Figure 7-6.

   Tighten the tip to the following specifications:

Tip Stud Thread Size	Torque		
	inch-lbs	foot-lbs	Nt-meters
1/2 in. x 20	360	30	40.7
3/8 in. x 24	336	28	37.9
5/16 in. x 24	300	25	33.9
1/4 in. x 28	240	20	27.1

Table 7-III Replaceable Tip Torque Values

Installing the Stack

1. With the stack at the angle shown in Figure 7-7, rest the booster mounting ring on the pin of the stack housing.

2. Brace the stack at point **A** in Figure 7-7, and swing the stack to a vertical position. The ultrasound contact button on the transducer should snap under the electrical contact leaf of the housing.

3. While still supporting the stack in this vertical position, install the stack access door, and thread the two or four socket-head bolts (that hold the door closed) into their holes.

4. If the horn is not properly aligned with the fixture, rotate the stack to align the horn with the fixture.

5. Finish tightening the socket head bolts until snug.

   DO NOT OVER-TIGHTEN!

NOTE

Do not apply any lubricant to the tip threads.

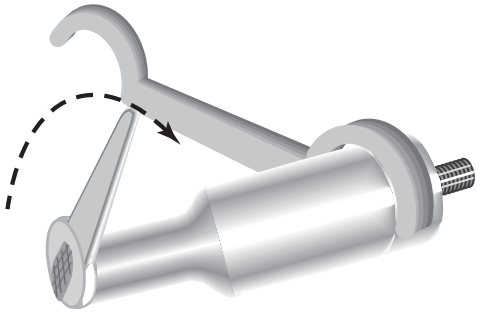

Figure 7-6 Tip Assembly

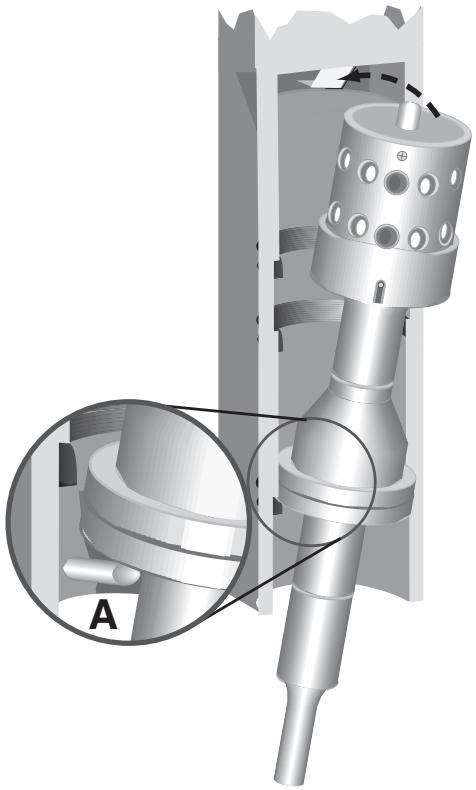

Figure 7-7 Stack Installation

NOTE

When all door screws are tightened, a small gap between the door and stack housing is normally present.

Fixture Installation

There are three steps involved in installing a fixture.

- Aligning the fixture with the horn,
- Leveling the fixture to provide the necessary support, and
- Rigidly securing the fixture to the mounting surface.

Fixture Alignment

To safely align the fixture under the horn, use the following procedure. (Refer to Figure 7-8.)

1. Depress the E-STOP (Abort) switch. This allows the acoustic stack assembly to be lowered by hand and prevents the system from accidentally cycling.
2. Turn off the power to the generator to prevent accidental ultrasound operation.
3. Place the fixture, with parts, under the horn.
4. Initially align the two slots in the fixture over two of the seven mounting holes on the base plate.
5. Install the two hold-down bolts with washers, and finger tighten.

WARNING

Any fixture manufactured by a third party must comply with all OSHA and ANSI requirements. All fixtures must be guarded as necessary.

Dukane Corporation does not assume any responsibility or liability for fixtures manufactured by the customer or any third party manufacturer.

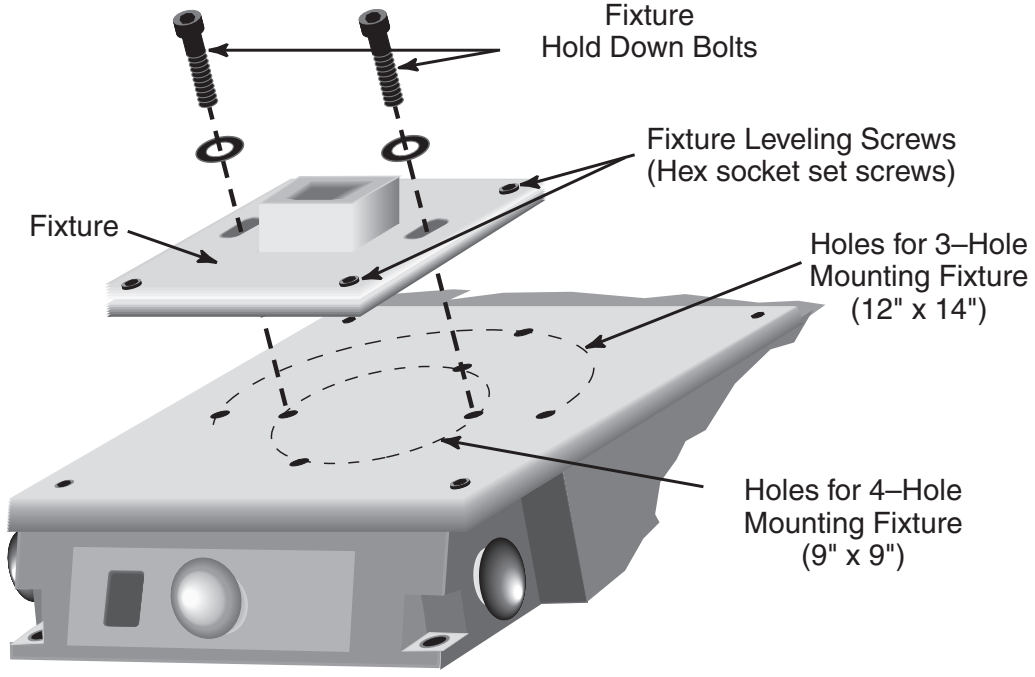

Figure 7-8 Fixture/Base Layout

Continued

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Fixture Alignment

6. Place a part in the fixture.
7. Grasping the horn firmly, pull the acoustic stack assembly down until the horn is as close to the part as necessary to align the fixture.
8. Align the fixture with the horn, and tighten the hold-down bolts, or cap screws, to prevent the fixture from moving.
9. Adjust the mechanical stop of the press so that the horn stops above the fixture. This prevents pinch points and avoids horn damage if the acoustic stack assembly descends when a part is not in the fixture.

NOTE
The fixture should be flat on the base. If the fixture is equipped with leveling jack screws, adjust the screws so that they do not interfere with seating of the fixture on the base plate.

Fixture Leveling

For most applications, the fixture must be mounted so that the contacting surfaces on the horn are parallel to the contacted surfaces on the plastic part. This ensures that a consistent, even weld will result. To level the fixture, do the following:

1. Place a part in the fixture.
2. Loosen (turn counterclockwise) the hold-down bolts or cap screws and the four leveling jack screws on the fixture plate. Refer to Figure 7-9.
3. Pull the acoustic stack assembly down to the fixture. Allow the horn and the part to align.
4. Turn the four jack screws clockwise until a slight resistance is felt. Refer to Figure 7-10.
5. Tighten the hold-down cap screws by turning them clockwise until a firm resistance is felt.

NOTE
Some applications may require the horn to be a few thousandths of an inch from contact with the fixture.

Special applications may require the Mechanical (MEC) stop to be lowered so the horn makes contact with the fixture or anvil. When this is required, a ground-detect circuit is needed to terminate the weld cycle.

NOTE
Do not overtighten the cap screws. This may flex the fixture plate.

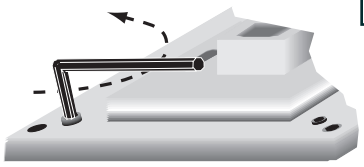

Figure 7-9 Loosening the Hold–Down Cap Screws and Jack Screws

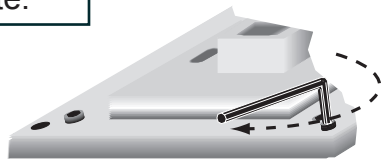

Figure 7-10 Tightening the Hold–Down Cap Screws and Jack Screws

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Fixture Leveling

6. If any readjustment is necessary, loosen the hold-down screws first. Then readjust the jack screws.

The following procedure may be helpful in leveling the fixture in some applications. To perform this procedure, use a piece of carbon paper and a piece of white paper.

1. Place a sample part in the fixture.
2. Place a piece of white paper on top of the sample part.
3. Place a piece of carbon paper, carbon side down, on top of the white paper.
4. Enter the following parameters into the press:

   Weld Time = 0.05
   Hold Time = 0.00

   System parameters = Use default settings. See examples on Application Setup Worksheet.
5. Set pressure to a value from 20 to 40 psi.
6. Set the trigger control on the thruster so that the pressure switch closes after some pressure is applied.
7. Press the ONLINE button on the front panel.
8. Cycle the equipment by activating both finger switches on the base or by triggering the automation switch.

When one cycle is completed, the pressure developed between the horn and the sample part will have left marks from the carbon paper on the white paper. If the fixture is not level, the carbon markings will be darker in some areas than in others. All carbon markings will be uniform when all adjustments have been made properly.

Adjust the leveling of the fixture and repeat this procedure as necessary until you are confident that the fixture is level.

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SECTION 8

Stack Maintenance

Inspection of the Acoustic Stack Components 93
Reconditioning Stack Components 94
Torque Values. 95

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Inspection of the Acoustic Stack Components

It is essential that the mating faces between an ultrasonic transducer/booster and a booster/horn be absolutely flat and parallel. If there is any air gap, there will be a loss in power output and efficiency. Coupling may be so poor as to prevent the startup of vibration from the stack, due to the excessive power draw at the mating surfaces.

The condition of excessive crowning, or uneven contact surfaces, is normally made evident by a burnished appearance around the bolt hole areas of the contact surfaces. This condition indicates that contact between the parts occurs only at the burnished areas and not across the full faces of the mating surfaces. See Figure 8-1.

The following flatness tolerances are specified for Dukane transducers, boosters, and horns used in 20 kHz applications:

Transducer	.0005 inch
Booster	.0005 inch
Horn	.0005 inch

To check if there may be a flatness problem, first disassemble the stack and look at the mating surfaces. If there are burnished areas at the periphery of a contact surface, that surface may be crowned in the center. Place a straight edge along the face. Refer to Figure 8-2. If light can be seen along the edges, it is crowned.

The surface may also be depressed in the bolt area. Refer to Figure 8-3. In this case, there will be contact only at the peripheral edges and light will be visible beneath the straight edge in the center region.

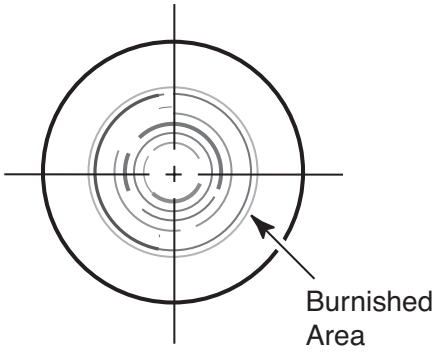

Figure 8-1 Example of Burnished Area

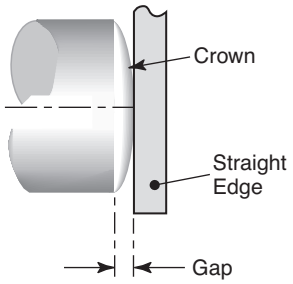

Figure 8-2 Example of Crowning

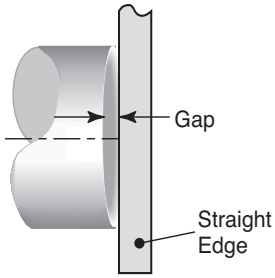

Figure 8-3 Example of Center Depression

Reconditioning Stack Components

To restore the interface to the proper condition, do the following:

1. Disassemble the transducer/booster/horn stack and wipe interfaces with a clean cloth or paper towel.
2. Examine all interfaces. If any interface is corroded or shows a dark, hard deposit, it should be reconditioned.
3. If the interfaces appear to be in good condition, go to Step 11.
4. If necessary, remove the mounting studs.
5. Tape a clean sheet of #400 grit (or finer) silicon carbide wet-or-dry paper to a clean, smooth, flat surface. A piece of plate glass is usually suitable.
6. Hold the part to be conditioned at its lower end with your thumb over a spanner wrench hole. Carefully stroke the part **once** in one direction (toward you) across the abrasive paper, as shown in Figure 8-4. Do not apply downward pressure. The component's weight alone provides sufficient pressure. Perform a second stroke.
7. Rotate the part 120° (1/3 rotation) to the next spanner wrench hole. Repeat the procedure outlined in Step 6.
8. Rotate the part the remaining 120° and repeat. Be certain to perform the same number of strokes at each orientation: Two strokes per rotation.
9. Before reinserting a stud in any horn, perform the following for proper engagement of the threads:

    a. Visually inspect and clean the stud.

    b. Clean the threaded hole using a clean cloth or towel.

    c. Tighten the stud to the torque specifications listed in Table 7-I.

NOTE

The operating efficiency of the equipment will be greatly affected if the mating interfaces of the transducer/booster/horn stack are not flat, make poor contact with each other, or become corroded. A poor contact condition wastes power output, makes tuning difficult, can affect the noise level, and can cause possible heat damage to the transducer.

CAUTION

Use extreme care to avoid tilting the part. Loss of flatness of interface surfaces may render the welding system inoperative.

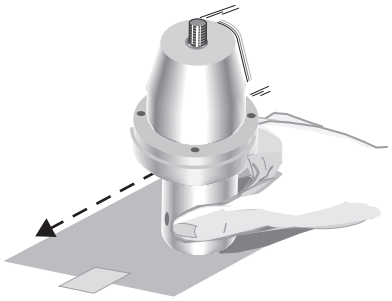

Figure 8-4 Method of Component Resurfacing

CAUTION

Use extreme care to avoid multiple strokes at each 1/3 rotation of the part. Loss of flatness and perpendicularity of the interface surface to the centering axis of the part may render the welding system inoperative.

Continued

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Reconditioning Stack Components

10. Reexamine the interface surface and repeat Steps 6 through 9 until most of the contaminate has been removed. This should not take more than 2 or 3 complete rotations of the part being reconditioned.

11. Reassemble and install the stack, using the procedure in ***Section 7*** of this manual. Recheck the power supply tuning.

Torque Values

See ***Section 7, Acoustic Stack/Fixture Setup*** for torque values:

Table 7-I - Stud Torque Values

Table 7-II - Horn/Booster Torque Values

Table 7-III - Replaceable Tip Torque Values

NOTE

Thread deformation may occur if the studs are overtightened. Removal of the stud could damage the threads in the horn. If this occurs, re-tap the horn threads and replace the stud with a new one. Use studs recommended by Dukane.

NOTE

Overtightening stack components may result in horn/booster studs loosening and unexplained overloads.

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SECTION 9

System Maintenance

Press Six-Month Periodic Maintenance 99

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Press Six-Month Periodic Maintenance

1. Disconnect the press AC power cord from the AC line receptacle. Then, remove the thruster left and right side covers.

2. Check that all socket-head cap screws in the press/thruster are tight. Check the air cylinder mounting.

3. Wipe or blow away all dirt and grease in the press/thruster.

4. Wipe away all excess oil and any dirt accumulation, especially at the exhaust openings in the transducer housing. There should be very little, if any, oil accumulation at the air exhaust opening. We recommend that no oil get into the press/thruster pneumatics. Regular accumulation of oil at the air exhaust opening means that some oil is getting into the pneumatics. To rectify this problem, route the air for the press/thruster through an “oil mist reclassifier”.

5. Check the press/thruster slide operation for smooth downward motion. Wipe away any accumulated grease, but do not apply any solvents. If movement is not smooth, the lower bearing may be greased with AFB lithium grease in the standard grease fitting provided.

6. Ensure that all wire and cable connections are secure in the press/thruster and are not rubbing or showing wear. If they do show wear or rubbing then reroute to eliminate the problem.

7. Remount and secure the press/thruster covers and reconnect the press AC power cord to the AC line receptacle.

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SECTION 10

Contacting Dukane

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Contacting Dukane

Identify Equipment

When contacting Dukane about a service–related problem, be prepared to give the following information:

- Model number, line voltage and serial number.
- Alarm indicators from the press display.
- Software version.
- Problem description and steps taken to resolve it.

Many problems can be solved over the telephone, so it is best to call from a telephone located near the equipment.

Intelligent Assembly Solutions

Mailing Address: Dukane Ultrasonics
2900 Dukane Drive
St. Charles, IL 60174 US

Phone: (630) 797–4900

E-mail: **ussales@dukane.com**

Fax:
Main (630) 797–4949

Service & Parts (630) 584–0796

Website

The website has information about our products, processes, solutions, and technical data. Downloads are available for many kinds of literature.

Here is the address for the main website:
www.dukane.com/us/

You can locate your local representative at:
www.dukane.com/us/sales/intsales.htm

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SECTION 11

Specifications

Layout Drawing. 107
Pneumatic Schematic. 108
Electrical Schematic 109
Weights, Dimensions, Operating Environment. 110
Compressed Air Requirements. 111
AC Power Requirements 111
Models, Ultrasonic Pressure. 112
Replacement and Repair Parts 113
Regulatory Agency Compliance 114

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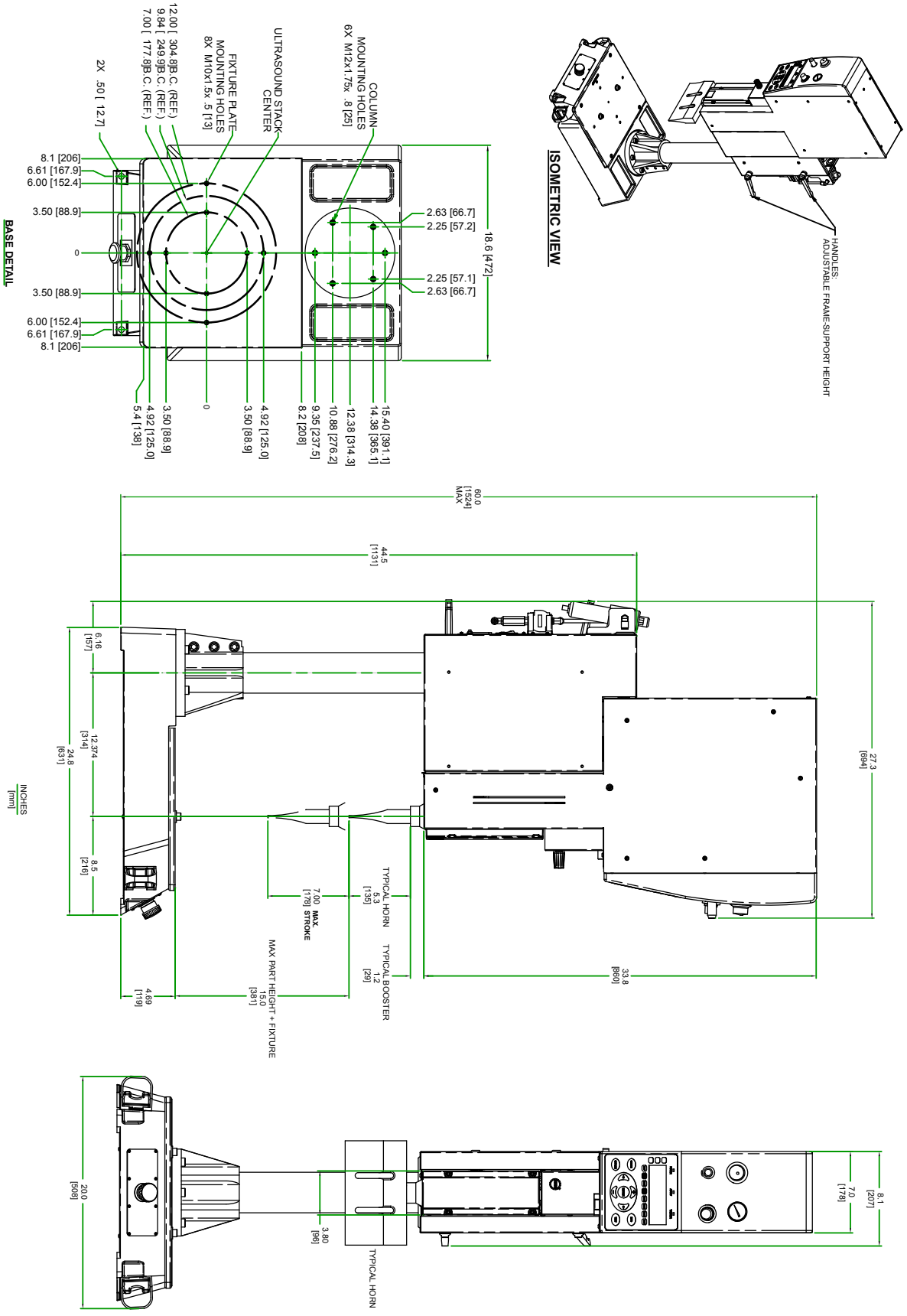

Figure 11-1 Layout - i220 Press System

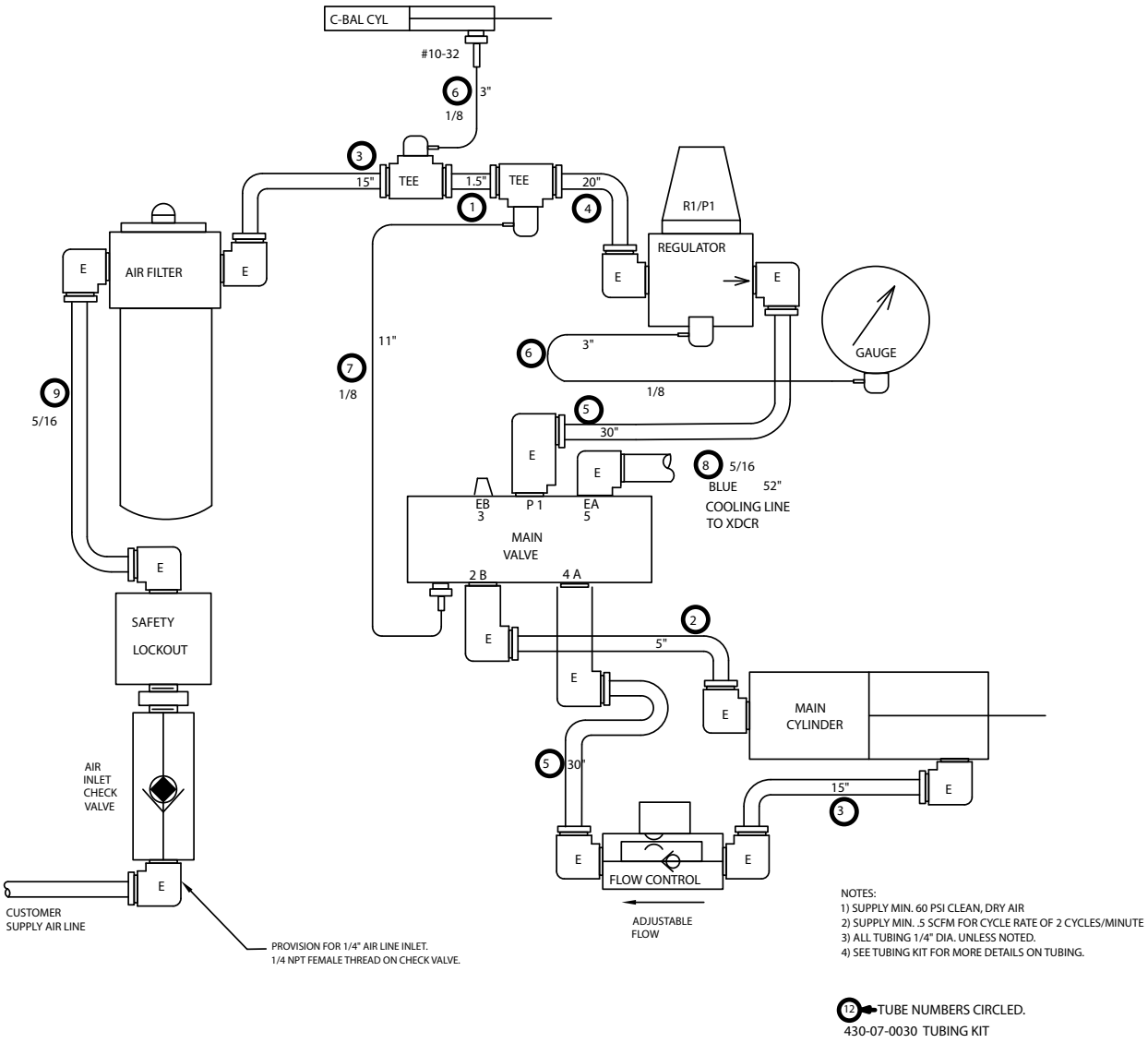

Figure 11-2 Pneumatic Schematic

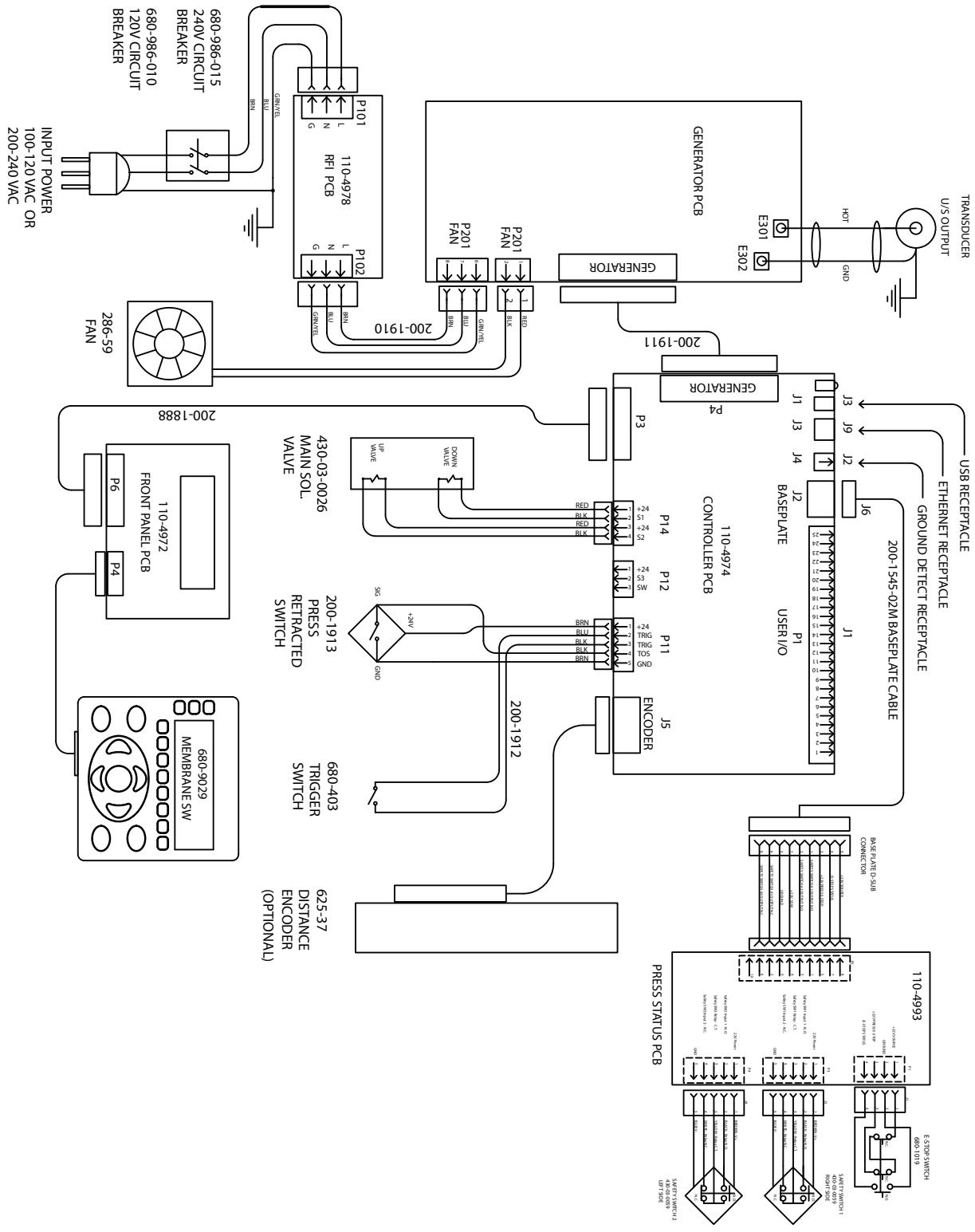

Figure 11-3 Electric Schematic i220

Weights

Model	Press System	
	Pounds	Kilograms
20122XC0P3	530	240

Shipping: Add 25 pounds (11.3 Kg) to unit weight for packing materials.

Table 11-I Weights

NOTE

A representative model was used in the weights and dimensions tables. Your model's weight and dimensions may vary somewhat from what is shown here.

Dimensions

in (mm)

Model Number	Press (includes base and column)		
	Height	Width	Depth
20122XC0P3	60 (1,524)	20 (508)	27 (685.80)

NOTE: Add 4" (100 mm) behind the press for air input line and cable connections.

Table 11-II Dimensions

Operating Environment

Operate the equipment within these guidelines:

Temperature: 40°F to 100°F (+5°C to +38°C)

Air Particulates: Keep the equipment dry.
Minimize exposure to moisture, dust, dirt, smoke and mold.

Humidity: 5% to 95% Non–condensing @ +5°C to +30°C

Non Operating storage guidelines:

Temperature: -4°F to 158°F (-20°C to +70°C)

Air Particulates: Keep the equipment dry.
Minimize exposure to moisture, dust, dirt, smoke and mold.

Humidity: 5% to 95% Non–condensing @ 0°C to +30°C

Compressed Air Requirements

For all press/thruster models, Dukane recommends 60-110 psi of clean, dry air.

Maximum available clamping pressure:

Model	Force Generated at 110 psi (lb)	Standard Air Cylinder Diameter (in)
20122XC0P3	540	2.50

Table 11-III Clamping Pressure

NOTE

A representative model was used in the compressed air requirements table. Your model's force and air cylinder diameter may vary somewhat from what is shown here.

AC Power Requirements

The AC line voltage and current needed depend on whichever press has been chosen for your system. See the table below.

Operating Frequency	Press Model Number	Overload Power Ratings (Watts)	Input AC Power Requirements Nominal AC Volt @ Maximum RMS Current	North America/ Japan AC Outlet Rating
20kHz	20122XC0P3	1200	100-120V 50/60 Hz @ 15 Amps	15 Amps
20kHz	20121XC0P3	1200	200-240V 50/60 Hz @ 8 Amps	
20kHz	20122XC0P5	1200	100-120V 50/60 Hz @ 15 Amps	
20kHz	20121XC0P5	1200	200-240V 50/60 Hz @ 8 Amps	
20kHz	20242XC0P3	2400	200-240V 50/60 Hz @ 15 Amps	
20kHz	20242XC0P5	2400	200-240V 50/60 Hz @ 15 Amps	

Table 11-IV AC Power Requirements

NOTES:

An X used above in the Model Numbers is a “wildcard” character meaning any valid character code combination.

Maximum line current requirement is specified at the minimum nominal AC line voltage and the rated power level.

WARNING

Never operate the generator at voltages lower than 100V. Current will exceed the rating and cause a shock hazard.

Models - *iQ Series* Integrated Press System i220

Model Number	Description
20121XC0P3	iQ Integrated 20kHz 1200 W 120V System with Time and Energy
20122XC0P3	iQ Integrated 20kHz 1200 W 220V System with Time and Energy
20121XC0P5	iQ Integrated 20kHz 1200 W 120V System with Time, Distance and Energy
20122XC0P5	iQ Integrated 20kHz 1200 W 220V System with Time, Distance and Energy
20242XC0P3	iQ Integrated 20kHz 2400 W 240V System with Time and Energy
20242XC0P5	iQ Integrated 20kHz 2400 W 240V System with Time, Distance and Energy

Table 11-V Model Number Descriptions

Ultrasonic Pressure

Ultrasonic Pressure	
***iQ* Generator Models - kHz**	20
Useful Beam	360 degrees
Ultrasonic Pressure @ Operator's Position - dB	140
Ultrasonic Pressure 1 m from the Equipment- dB	130

Table 11–VI ***iQ*** Generator Ultrasonic Pressure

NOTE

All measurements taken with Data Physics Dynamic 4-Channel Signal Analyzer with calibrated 377C01 Microphone and 426B02 Preamplifier.

Replacement and Repair Parts - *iQ Series* i220 Press

System Replacement Parts

Part Number	Part Description	Model
		43i220
474-33	High pressure grease packet	X
403-594-XX	User's Manual iQ Series Ultrasonic Integrated Press System i220	X
430-03-0026	iQ main valve assembly	X
110-3122B	Transducer	X
Various	One set of external system cables	X
721-31-00056	Transducer door hex key 43Q220/43Q340	X
721-68	43i220 Spanner wrench	X

Table 11-VII System Replacement Parts

X = available
O = unavailable

Repair Parts List

Part Number	Part Description	Model
		43i220
430-03-0026	iQ main valve assembly	X
804-33	Primary air cylinder, 2 1/2 " bore X 7"	X
804-52	Air pressure regulator	X
804-63	Counter balance air cylinder 9/16" bore X 11"	X
625-37	Optical distance encoder (when optional encoder feature is installed)	X

Table 11-VIII Replacement Parts

NOTE

Dukane recommends that a spare horn and booster for each product application be on hand.

Regulatory Agency Compliance

FCC

The ***iQ*** i220 Integrated Press complies with the following Federal Communications Commission regulations.

- The limits for FCC measurement procedure MP-5, "Methods of Measurement of Radio Noise Emissions from ISM Equipment", pursuant to FCC Title 47 Part 18 for Ultrasonic Equipment.

CE Marking

This mark on your equipment certifies that it meets the requirements of the EU (European Union) concerning interference causing equipment regulations. CE stands for Conformité Europeéne (European Conformity). The equipment complies with the following CE requirements.

- The EMC Directive 2004/108/EC for Heavy Industrial —
  EN 61000-6-4: 2001
  EN 55011: 2003
  EN 61000-6-2: 2005
  EN61000–4–2
  EN61000–4–3
  EN61000–4–4
  EN61000–4–5
  EN61000–4–6
  EN61000–4–8
  EN61000–4–11
- The Low Voltage Directive 2006/95/EC.
- The Machinery Directive 2006/42/EC.
  EN 60204: 2006
  Safety of Machinery - Electrical Equipment of Machines Part 1: General Requirements.

IP (International Protection) Rating

The ***iQ*** i220 Integrated Press has an IP rating from the IEC (International Electrotechnical Commission).
The rating is IP2X, in compliance with finger-safe industry standards.

UL

The ***iQ*** i220 Integrated Press complies with these standards:

Underwriters Laboratories:

UL 61010-1:2012, and

National Standards of Canada:

CAN/CSA C22.2 No. 61010-1-12:2012

as verified by TÜV Rheinland.

CAUTION

DO NOT make any modifications to the press or associated cables as the changes may result in violating one or more regulations under which this equipment is manufactured.

SECTION 12
Appendices

Appendix A, List of Figures. 117
Appendix B, List of Tables 120

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Appendix A List of Figures

No.	Description	Page
2-1	Example of 220/240 Volt, Grounded, 3-Prong Receptacle	9
2-2	International 220/240V Grounding	9
2-3	Compressed Air Filter	10
3-1	Lockout Device In Open Position, Unlocked	15
3-2	Bottom Lockout Device In Closed Position, Locked	15
3-3	Press Rear View	18
3-4	System I/O Panel (Standard Panel Shown)	20
3-5	DB-25M, Press Input/Output Cable Connector (J1)	20
3-6	Ground Detect Fixture Installation	24
3-7	Press Base Rear - Grounding Stud and J35 Base Interface Connector	25
3-8	Press Connections	27
3-9	Example of Press Placement	29
3-10	Using Handles to Make Adjustments	29
3-11	To Relocate Handles	29
3-12	Flange Template	32
4-1	Front Panel Controls	35
4-2	Display Detail, Operating Mode Indicator	36
4-3	Display Detail, Power Output Level	36
4-4	Navigation Keys (4) with Enter, Info and Cancel	37
4-5	Info Menu Display	37
4-6	Active Soft Keys, Example	37
4-7	Display Detail, Power Output Level	39
4-8	Making Selections	40
4-9	Arrows Indicate Direction of More Text	40
4-10	Press Controls and Indicators - Front View	42
4-11	Trigger Control Knob	43
4-12	Press Left Side View with Detail	44
4-13	Ergonomic Base Controls	45
4-14	Right Operate Switch in Standby Mode, One LED Dimly Lit	45
4-15	Right Switch in Operate Mode, Both LEDs Brightly Lit	45
4-16	Setting and Resetting the E-STOP	46

Continued

Appendix A List of Figures

No.	Description	Page
5-1	Rear Panel AC Breaker Switch	49
5-2	Front Panel with Power On Light	49
5-3	i220 Integrated Press Menu Overview	51
5-4	Setting Weld Amplitude	52
5-5	Setting Weld Amplitude with Afterburst Enabled	52
5-6	Setting Weld Amplitude, Pre-Trigger Available	53
5-7	Setting Weld Amplitude	53
5-8	Setting Weld Amplitude with Afterburst Enabled	53
5-9	Pre Weld Menu, Mode is Manual Press	54
5-10	Pre Weld Menu, Pre-Trigger Menu	54
5-11	Pre Weld Menu, Pre-Trigger Menu, Start of Cycle Selected as Type	54
5-12	Pre Weld Menu, Pre-Trigger Menu, Amplitude Adjustment	54
5-13	Pre Weld Menu, Trigger Menu	55
5-14	Pre Weld Menu, Maintained Trigger Selected	55
5-15	Pre Weld Menu, Trigger Selected is Power	55
5-16	Weld Menu, Mode: Manual/Automated Press, Distance Not Supported	56
5-17	Weld Menu, Mode: Manual/Automated Press, Energy Selection	56
5-18	Weld Menu, Mode: Manual/Automated Press, Distance Is Supported	56
5-19	Weld Menu, Mode: Manual/Automated Press, Energy Entry	56
5-20	Post Weld Menu	57
5-21	Post Weld Menu, Time Setting	57
5-22	Post Weld Menu, Afterburst Disabled	57
5-23	Post Weld Menu, Afterburst Enabled	57
5-24	Limits Menu	58
5-25	Limits Menu, Bad Soft Key Pressed	58
5-26	Limits Menu, Setting Upper and Lower Limits	58
5-27	Limits Menu, Bad Parts Limits Enabled for Time	58
5-28	Setup, Typical Display	59
5-29	Operate Screen	60
5-30	Live Data Screen	61
5-31	In Cycle Screen	61
5-32	Test Screen	61
5-33	Info Menu Display	62

Continued

Appendix A List of Figures

No.	Description	Page
5-34	System Info	62
5-35	Regional Settings, Language Menu	62
5-36	Regional Settings, Units Menu	62
5-37	Advanced Settings Menu Overview	63
5-38	Advanced Process Control Menu	63
5-39	Restore Defaults, Adv Process Controls	64
5-40	Restore Defaults, Confirmed	64
5-41	Advanced Process Control Sub-menu Items	65
5-42	Scan Stack - 1	66
5-43	Scan Stack - 2	66
5-44	Miscellaneous Sub-menu Items	68
5-45	Alarm Message Screen	69
6-1	Example of 120 Vol, Grounded, 3-Prong Receptacle	74
6-2	120VAC Power Inlet Panel	75
6-3	Distance Encoder Mounting	76
6-4	Distance Encoder Alignment	77
7-1	Stack Components	82
7-2	Stack Removal	83
7-3	Disassembling Components	84
7-4	Tip Removal	84
7-5	Assembling Components	85
7-6	Tip Assembly	86
7-7	Stack Installation	86
7-8	Fixture/Base Layout	87
7-9	Loosening the Hold-Down Cap Screws and Jack Screws	88
7-10	Tightening the Hold-Down Cap Screws and Jack Screws	88
8-1	Example of Burnished Area	93
8-2	Example of Crowning	93
8-3	Example of Center Depression	93
8-4	Method of Component Resurfacing	94
11-1	Layout - i220 Press System	107
11-2	Pneumatic Schematic	108
11-3	Electric Schematic i220	109

Appendix B List of Tables

No.	Description	Page
3-I	System Input/Output Connector Signals (J1)	21
3-II	Power Cords	28
3-III	Dukane Cable 200-1546-00 Signals	31
5-I	Alarm Messages	69
7-I	Stud Torque Values	85
7-II	Horn/Booster Torque Values	85
7-III	Replaceable Tip Torque Values	86
11-I	Weights	110
11-II	Dimensions	110
11-III	Clamping Pressure	111
11-IV	AC Power Requirements	111
11-V	Model Number Descriptions	112
11-VI	*iQ* Generator Ultrasonic Pressure	112
11-VII	System Replacement Parts	113
11-VIII	Repair Parts	113

SECTION 13

Index

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Index

A

Acoustic Stack/Fixture Setup 79
  Fixture Installation 87
    Fixture Alignment 87
    Fixture Leveling 88
  Installing a Detachable Tip 86
  Installing the Stack 86
  Removing a Detachable Tip 84
  Stack Assembly 85
  Stack Description 82
  Stack Disassembly 84
AC Power Inlet Panel 19
  Chassis Grounding Stud 19
  IEC AC Power Inlet Connector 19
  Power Switch/Circuit Breaker 19
Advanced Process Control
  Buzzer 68
  Free Run Freq 65
  Freq Lock and Hold 66
  Phase Shift 65
  Ramp Down Time 67,?68
  Ramp Up Time 67
  Restore Factory Defaults 68
  System Freq Limits 66
Agency Compliance
  IP (International Protection) Rating 114
ALARMS 69
Amplitude 36,?38
  AMP 52
  Power Scaling 39
  Range 53

B

Base Plate 45

C

CE Marking 114
Connecting Cables 27
Connecting Generator Cables 27
Connector
  Ergonomic Base Connector 25
Controls 33
  Generator Front Panel Controls
    Hot Keys 38
    Navigation Keys 37
    Power On Light 39
    Soft Keys 37
    System Operating Mode Keys 36
    System Power Output Level 39
  Manual Thruster Controls
    Down Speed Adjustment 41
  Press Controls 41
  Press Ergonomic Base 45
    Emergency Stop (Abort) Switch 46
  Screen Basics 40
    Interpreting On-screen Arrows 40
  Thruster Indicators
    Mechanical Stop Indicator Flag 43
    Pressure Gauge 43
    Slow Speed Indicator Flag (Optional) 43
    Stroke Position Indicator Flag 43

D

Distance Encoder 76
Drawings and Tables 3
Dukane 101
  Address 103
  Contacting 101
  E-mail 103
  Fax 103
  Intelligent Assembly Solutions 103
  Mailing Address 103
  Phone 103
  Website 103

E

Electrical Safety 8
  100/120 Volt Systems 9
  Domestic Power Grounding 9
  International Power Grounding 9
E-mail 103
Emergency Stop (Abort) Switch 46

F

FCC 114
Fixture Alignment 87
Flange Template 32
Free Run Freq 65
Freq Lock and Hold 66

Continued

G

General User Information 3
  Drawings and Tables 3
  Notes, Cautions and Warnings 3
  Read This Manual First 3
Generator Features
  Process Limits 4
Generator Menu Overview 51

H

Health and Safety 5
  General Considerations 7
    No Unauthorized Modifications 7
  How to Lift Safely 11
  Plastics Health Notice 8
  Recommendations 7
Hot Keys 38

I

Installation 13
  Before Installation 15
    When to Use Lockout / Tagout Devices 15
  Connecting Cables 27
  Placement 16
  Rear Panel 18
    AC Power Inlet Panel 19
      Chassis Grounding Stud 19
      IEC AC Power Inlet Connector 19
      Power Switch/Circuit Breaker 19
    System I/O Panel 20,?25
      System Inputs Connector 20,?24
  Unpacking 17
  Utilities 16
Installing the Press System 17
  Placement 17
  Press Height Adjustment 29
  Without Machine Base 30
Introduction 1
  General User Information 3
  Key Generator Features 4
  Press System Overview 4
IP (International Protection) Rating 114

L

List of Figures 117

M

Maintenance
  Six-Month Periodic Maintenance 99
Menus 51

N

Navigation Keys 37
Notes, Cautions and Warnings 3

O

Operate
  TEST 61
  Using the Menus
    IN CYCLE 61
    LIVE 61
Operation 47
  ALARMS 69
  Stopping the Weld Cycle 50
  Using the Menus 51
    AMP 52
    Generator Menu Overview 51
    INFO 62
      ADVANCED SETTINGS 63
      REGIONAL SETTINGS 62
      SYSTEM INFO 62
      UNITS 62
    LIMITS 58
    OPERATE 60
    POST-WELD 57
    PRE-WELD 54
    SETUPS 59
    WELD 56
Options 71
  AC Power Inlet Panel 75
  Distance Encoder 76
  Power Inlet Options 74

Continued

P

Phase Shift 65
Press Controls 41
  Manual Thruster Controls 41
Press Ergonomic Base 45
Press Height Adjustment 29
Press System Overview 4
Process Limits 4

R

Ramp Down Time 67
Ramp Up Time 67
Rear Panel AC Breaker Switch 49
Rear Panel Layout 18
  Rear Panel AC Breaker Switch 49
Reconditioning Stack Components 94
Regulatory Agency
Compliance 114
Regulatory Agency Compliance
  CE Marking 114
  FCC 114
  IP (International Protection) Rating 114
Replacement Parts 112,?113
RFI Grounding 26

S

Screen Basics 40
Setup
  Stack/Fixture 79
Soft Keys 37
Specifications 105
  AC Power Requirements 111
  Compressed Air Requirements 111
  Dimensions 110
  Electric Schematic 220 109
  Layout - 220 Thruster 107
  Operating Environment 110
  Pneumatic Schematic (All iQ LE Presses) 108
  Ultrasonic Pressure 112
  Weights 110
Stack Maintenance 91
  Inspection of the Acoustic Stack Components 93
  Reconditioning Stack Components 94
Stopping the Weld Cycle 50
System Freq Limits 66
System Inputs Connector 20,?24
System I/O Panel 20,?25
  System Inputs Connector 20,?24
System Maintenance 97
System Power Output Level 39
System Status I/O
  Auto Start Input 68

T

TEST 61
Torque Values 95

U

Using the Menus 51
Utilities 16

W

Weld
  Weld Cycle
    MAX TIME 56
    Stopping 50

Continued

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Dukane ISO

ISO CERTIFICATION

Dukane chose to become ISO 9001 certified in order to demonstrate to our customers our continuing commitment to being a quality vendor. By passing its audit, Dukane can assure you that we have in place a well–defined and systematic approach to quality design, manufacturing, delivery and service. This certificate reinforces Dukane's status as a quality vendor of technology and products.

To achieve ISO 9001 certification, you must prove to one of the quality system registrar groups that you meet three requirements:

1. Leadership
2. Involvement
3. Quality in Line Organizations and Quality System Infrastructure.

The ISO 9001 standard establishes a minimum requirement for these requirements and starts transitioning the company from a traditional inspection–oriented quality system to one based on partnership for continuous improvement. This concept is key in that Dukane no longer focuses on inspection, but on individual processes.

Dukane's quality management system is based on the following three objectives:

1. Customer oriented quality. The aim is to improve customer satisfaction.
2. Quality is determined by people. The aim is to improve the internal organization and cooperation between staff members.
3. Quality is a continuous improvement. The aim is to continuously improve the internal organization and the competitive position.

ISO 9001 CERTIFIED

Dukane products are manufactured in ISO registered facilities.

View the Dukane ISO certificate of compliance at: *http://www.dukane.com/ISORegistrationCertificate.pdf*

Please refer to our website at:

www.dukane.com/us/sales/intsales.htm

to locate your local representative.

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